

No. 637,558.

Patented Nov. 21, 1899.

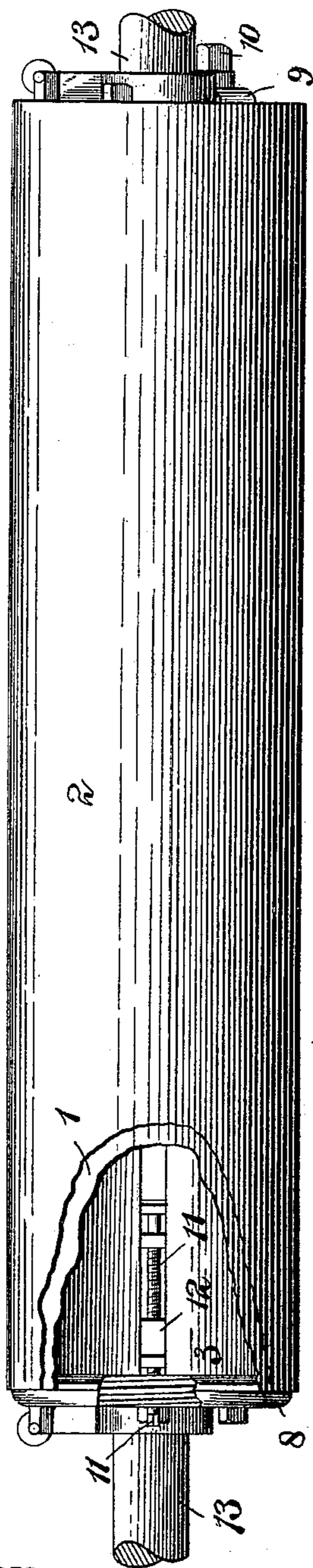
E. HETT.
MULTICOLOR PRINTING.

(Application filed Nov. 1, 1899.)

(No Model.)

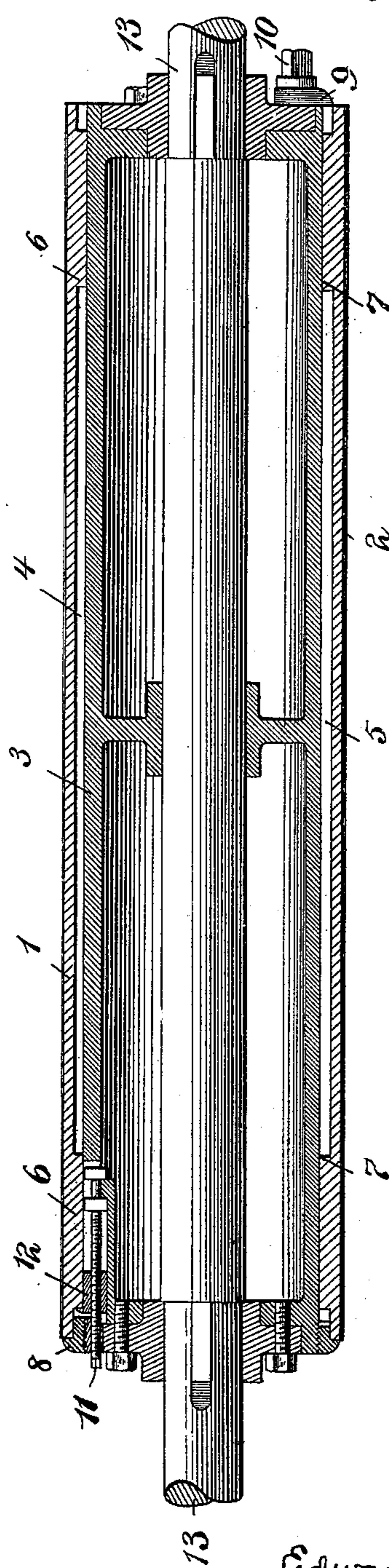
6 Sheets—Sheet 1.

Fig. 1.



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Fig. 2.



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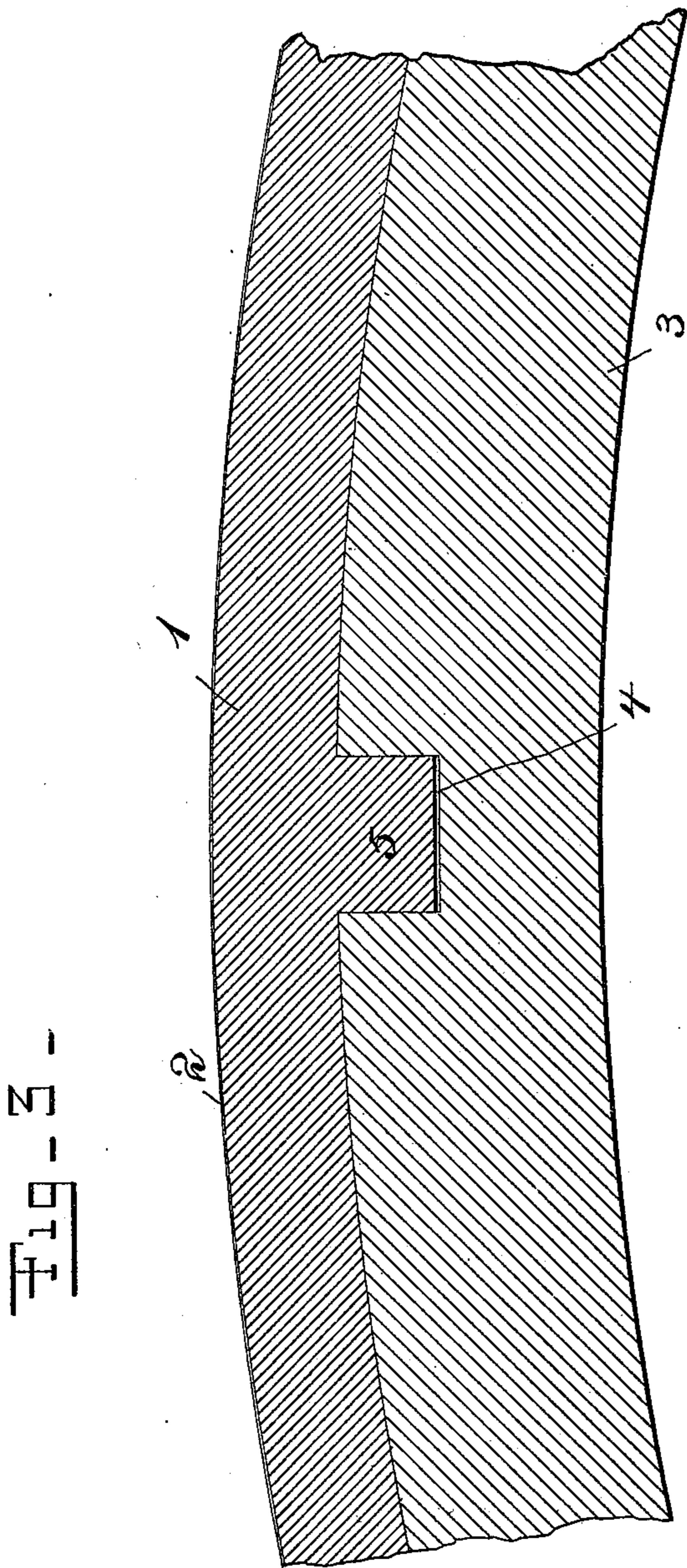


Fig. 1

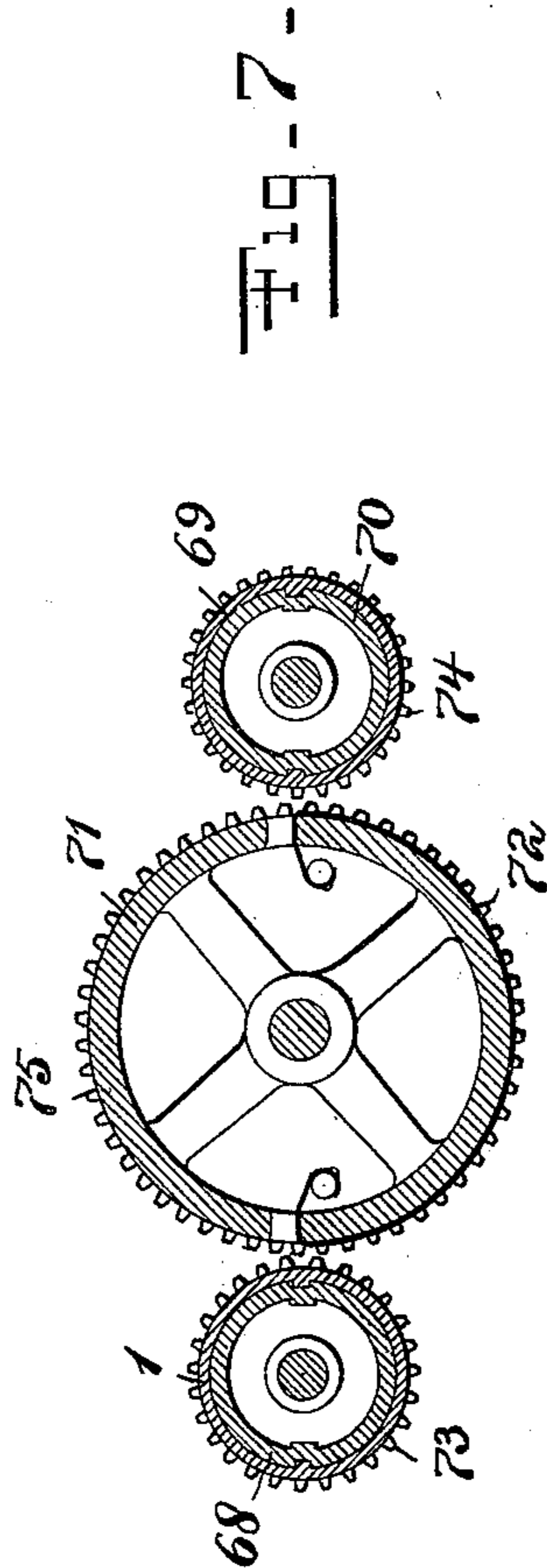


Fig. 2

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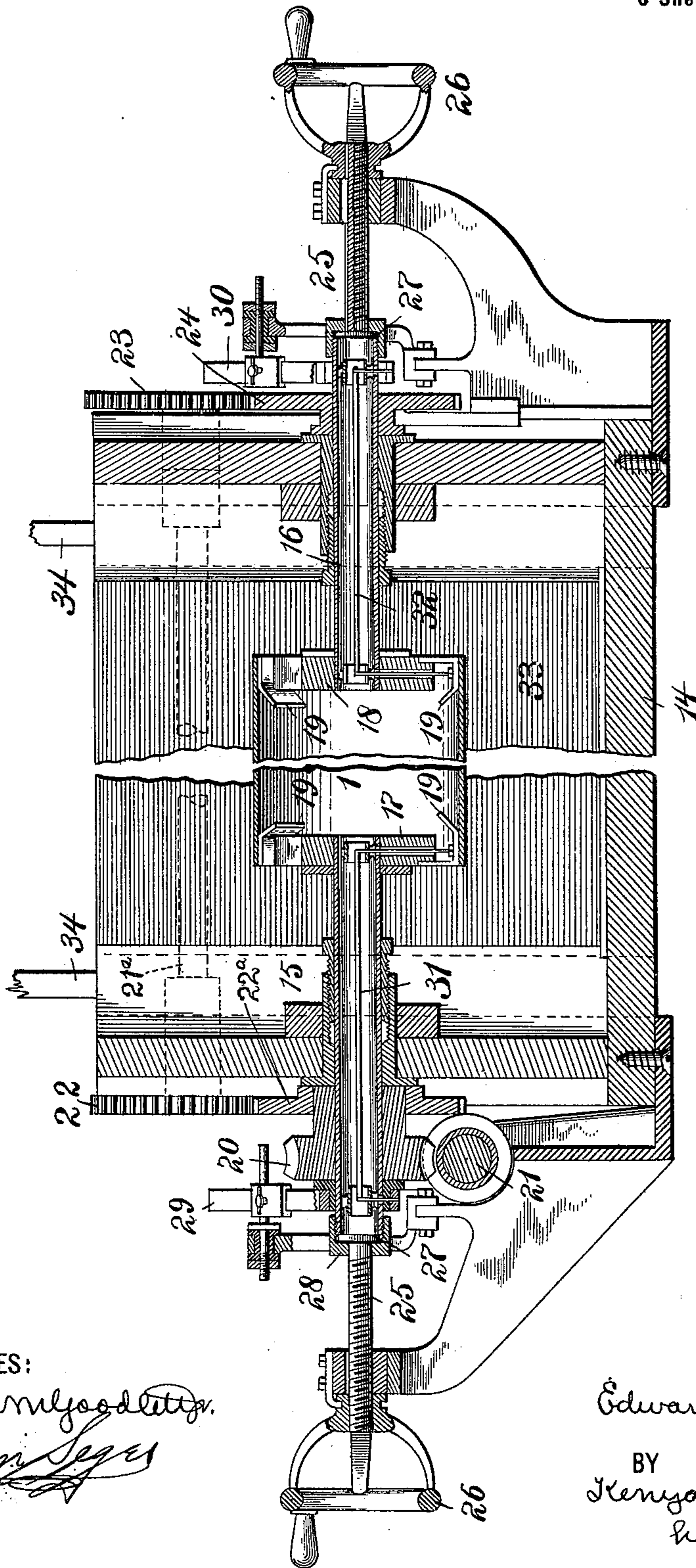
E. HETT.
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(No Model.)

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Fig. 4—



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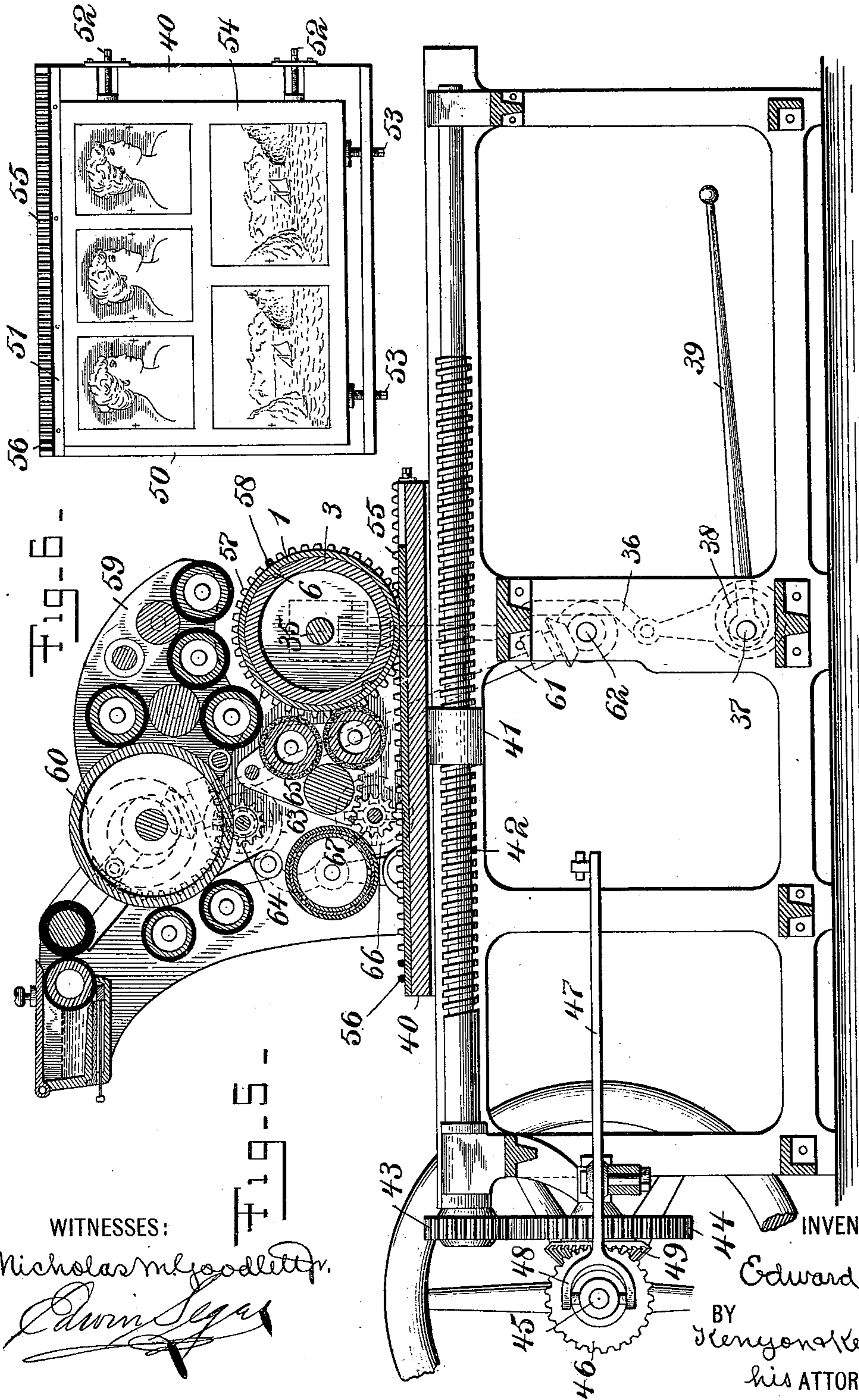
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MULTICOLOR PRINTING.

(Application filed Nov. 1, 1899.)

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6 Sheets—Sheet 4.



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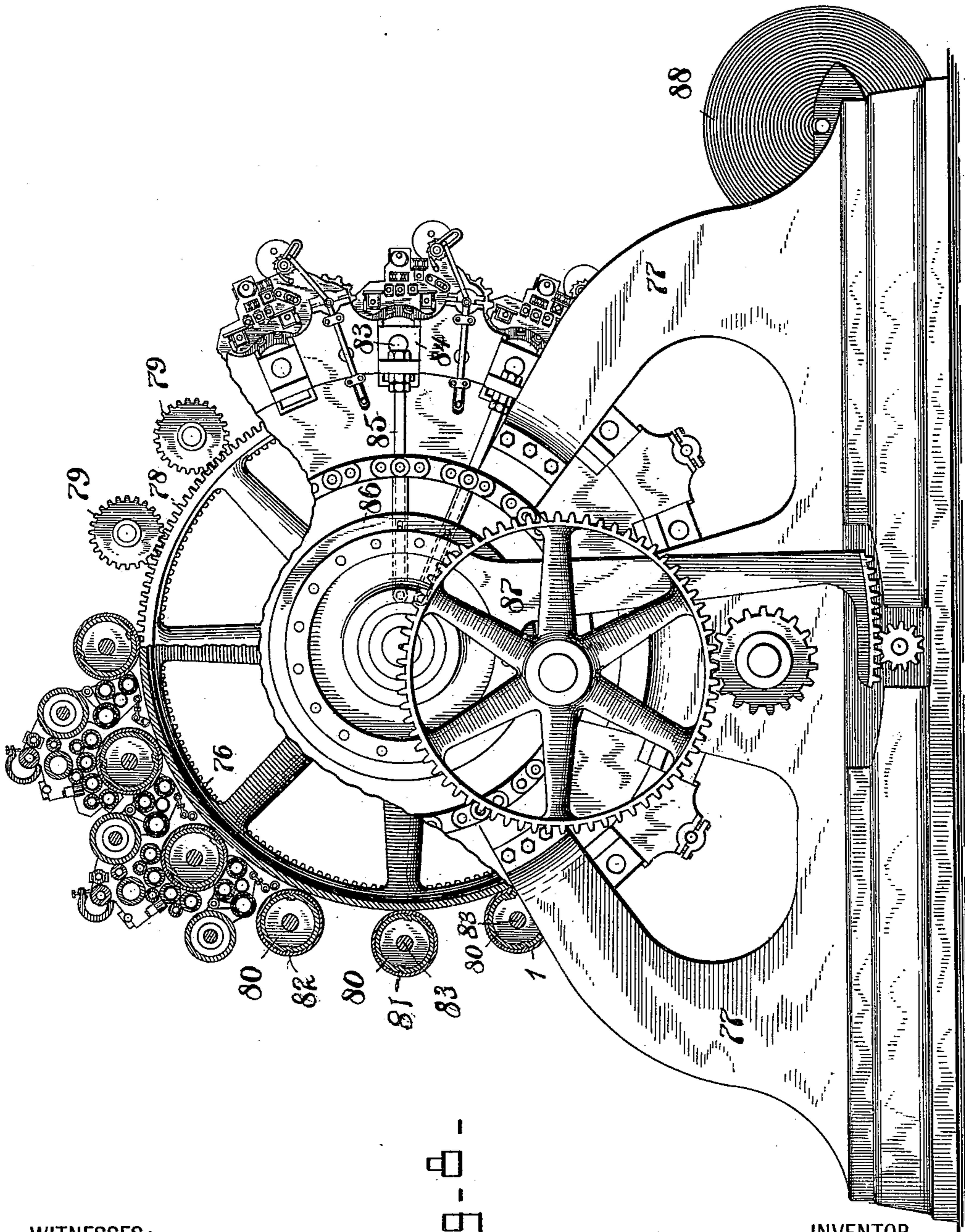
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6 Sheets—Sheet 5.



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19-11

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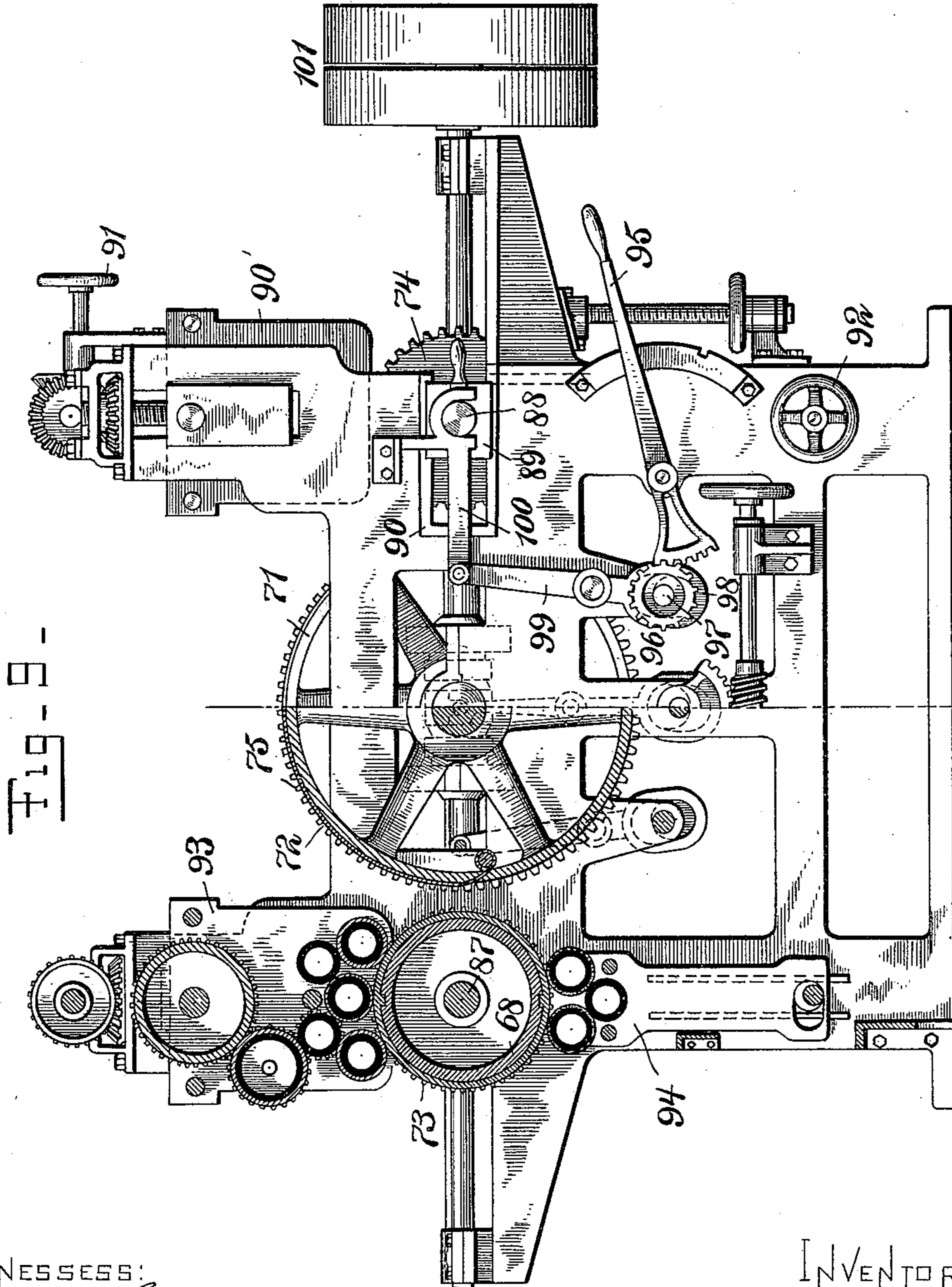
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(Application filed Nov. 1, 1899.)

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6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

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MULTICOLOR-PRINTING.

SPECIFICATION forming part of Letters Patent No. 637,558, dated November 21, 1899.

Application filed November 1, 1899. Serial No. 735,447. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, residing at New York, (New Dorp, Staten Island,) in the county of Richmond and State of New York, have invented certain new and useful Improvements in Multicolor-Printing; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to multicolor-printing; and it consists of a new method whereby the printing may be effected.

The invention contemplates three general divisions of procedure. The first division relates to the production of suitable printing-forms, made with substantial accuracy of shape and dimensions, both of which are predetermined with reference to the subsequent treatment and handling of the printing-forms in the second and third divisions of procedure. The second division relates to the careful imposition upon the finished printing-forms of the component designs to be finally printed in accurate register. In this second division the printing-forms are mounted in accurately established and predetermined positions with reference to a cooperating basic surface or a succession of such basic surfaces, preestablished guides or fixed guiding means being employed to secure immediate substantial accuracy in attaining the required working relationship of a basic surface and its coacting printing-form and of the succession of basic surfaces and their coacting printing-forms, whereby the component designs are imparted to or imposed upon the printing-forms to transform them into printing-surfaces which are adapted to automatically register when mounted in a printing-press in which the third division of procedure is carried out. In carrying out the second division of procedure suitable mechanism, such as a transfer-press, is employed. The printing-forms and the basic surfaces are made of predetermined size and shape, so as to accurately fit their accurately made and predetermined seats in the transfer-press, and the printing-forms, the transfer-press, and the printing-press are so constructed with reference to each other that the printing-forms when removed

from the transfer-press and mounted in the printing-press fit accurately in predetermined places provided to receive them in such printing-press, their position in the printing-press being attained at once and with accuracy by the employment of fixed guides. Thus the printing-surfaces are so made as to be register printing-surfaces adapted to automatically register in the printing-press and without the trial adjustments heretofore necessary in attaining accurate register in multicolor-printing. This arranging of the printing-forms accurately in their predetermined places in the press and in predetermined relationship with reference to each other and printing therefrom constitute the third division of procedure.

In the accompanying drawings, forming part of this specification, and in which like reference-numerals designate corresponding parts, embodiments of the various instrumentalities are illustrated which are preferably employed in carrying out the method.

My improved method may be carried out by means of any other suitable instrumentalities; but I prefer for this purpose to use those shown in the drawings herein.

Referring now to the drawings shown herein, Figure 1 is a side elevation of a printing-form partly broken away and before the design is imposed thereon. Fig. 2 is a longitudinal sectional elevation of the same. Fig. 3 is a sectional end elevation of part of the printing-form, and Fig. 4 is a central sectional elevation of an electrolytic-bath apparatus employed in making the said style of printing-form shown in Figs. 1, 2, and 3. Fig. 5 is a central sectional elevation of a transfer-press employed in imposing upon or imparting to the printing-form the design to be printed thereby and by aid of which transfer-press the printing-form is transformed into a printing-surface for the design so imparted. Fig. 6 is a plan view of the bed of the transfer-press and showing the setting-up plate mounted thereon. Fig. 7 is a diagrammatic view, in sectional elevation, showing a machine which may be advantageously employed in imposing the design to be printed upon a printing-form. Fig. 8 is a side elevation, partly broken away and in section, of a printing-press in which the printing-surfaces

are mounted for printing. Fig. 9 is a side elevation, partly in central section, of a transfer-press embodying the arrangement in Fig. 7.

Referring now to the first division of the production of suitable printing-forms, I prepare in any suitable manner and by any suitable means a series of printing-forms of predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press and to fit and work accurately with the cooperating parts of the printing-press. Each printing-form I provide, in any suitable manner and by any suitable means, with a surface suitable to have imposed upon it and to print a design.

I will now proceed to describe my preferred construction of printing-form and my preferred mode of preparing the same; but I wish it understood that I do not limit myself to such preferred construction and mode, as any other suitable construction or mode may be employed. For example, it is not necessary to an embodiment of my invention in all its broad aspects that the printing-forms be hollow, or be composed of bases and form-supports, or that the exterior surface of the printing-form be a separate and distinct part or coating of the printing-form itself, or be a coating at all, or when it is a coating that it be an electrodeposited one.

The construction of printing-form and the mode of preparing the same which I prefer to use will now be described. This printing-form and the method of making it are of my invention and are made the subjects of separate applications filed by me simultaneously herewith.

In constructing my printing-form it is important that it be made of predetermined size and shape, so as to fit accurately the cooperating parts of the press in connection with which it works. This is accomplished by providing a base of accurate predetermined size and shape and applying thereto a coating suitable to receive a design or a plurality of designs and to be developed into a printing-surface therefor. By means of such a base I am enabled to obtain a composite printing-form consisting of the base and the coating applied thereto of accurate predetermined size and shape, so as to accurately fit and work in the predetermined place provided for it in the press. If the coating is quite thin, as it may be in some cases, it may be disregarded in attaining the required size of printing-form, reliance being placed entirely upon the size of the base in obtaining the predetermined size of the printing-form. If, however, as preferred, the coating is of substantial thickness, so as to substantially affect the size of the printing-form, then attention must be paid to the thickness of the coating, which will be necessarily predetermined in obtaining the predetermined size of the printing-form. The coating is adherent to and integral with the base, and it is quite possible, and in securing certain advantages of the in-

vention it is quite important, to so apply the coating to the base that the coating may be removed from and renewed on the base, the printing-form with each new coating being made, nevertheless, of predetermined size and shape. In accomplishing this result I employ a base of permanent predetermined size and shape, this permanency of the base persisting throughout the removals and renewals of the coating and, either alone or in connection with the predetermined thickness of the coating, effecting the predetermined size of the composite printing-form. In removing and renewing the coating it is not always essential that the absolute size of the printing-form be maintained, although the same base be used. The absolute size of the printing-form would of course vary in consequence of varying requirements of different cases—that is to say, if the requirements of a particular place in the press and the particular relation of the cooperating parts of the press called for a certain size of printing-form the printing-form would be made of predetermined size and shape, so as to fulfil these requirements, although in so making it the same base might have been previously used for a printing-form of a different absolute, though predetermined, size and shape. Notwithstanding these possible variations in the absolute size of the printing-form, the size thereof will in every case be predetermined, so as to meet the particular requirements of each case. This is accomplished by applying to the permanent base coatings of varying, but predetermined, thicknesses. The printing-form is preferably made of metal, consisting of a metallic base with a metallic coating applied thereto by electrodeposition. At present zinc is the most suitable metal of which to form the coating. In the best construction of printing-form I provide a curved shell-like base, preferably a continuous cylindrical tube accurately finished on its interior and having a predetermined and permanently-maintained internal size and shape, so as to adapt it to fit removably and replaceably on a rotary support, always accurately in the same place. It will be found advantageous in most cases, moreover, to employ printing-forms of permanently-maintained absolute size and shape, especially where the coating is to be removed from and renewed on a base, because such printing-forms of permanently-maintained size and shape can be the more readily and speedily made and with accuracy and certainty of result. This follows from the fact that standard and permanently-maintained conditions of applying the coating to a base of permanent predetermined size and shape may be employed.

In Figs. 1 and 2 is shown the composite printing-form, comprising the base 1 and the electrodeposited coating 2, the base being shown in said figures as a continuous cylindrical tube and the coating as continuous and seamless thereon. For the sake of economy

and facility of manipulation the printing-form is generally a shell and is provided with a support, from which it is removable. The tubular printing-form (shown in Figs. 1 and 2) has a cylindrical support 3, and the former has a slight interior taper and the latter a corresponding exterior taper, so that the printing-form may be easily removed from its support, which contacts with and firmly supports every point of the internal periphery of the printing-form. In order that the printing-form may be readily mounted always exactly in its predetermined position on its support 3, suitable guiding means for this purpose are provided, which insure absolute identity and accuracy of position at all times, both longitudinally and circumferentially. The guiding means for circumferential or transverse location (shown in Figs. 1 and 2) consists of two opposite longitudinal grooves 4 and 5, accurately cut on the exterior surface of the support 3, and corresponding ribs 6 and 7, formed on the interior of the printing-form and adapted to slide and accurately fit in these grooves, a marked rib of the form in a marked groove of the support. For the purpose of insuring identity and accuracy in the longitudinal position of the printing-form on its support, the support is provided with a collar 8, screwed on one end of the support to form a fixed abutment, against which one end of the printing-form accurately fits when in place on its support. The printing-form is locked in place against any accidental longitudinal movement by the clamps 9 and screws 10 on the opposite end of the support. The support 3 is generally provided at the end on which the collar 8 is fixed with a screw 11, extending through a nut 12, adapted to travel to and fro on the screw and arranged to start the printing-form from its seat by the rotation of the screw. If desired, the support 3 may be so constructed as to be removable from its shaft 13, and, if required, the printing-form may be fixed permanently on the form-support, and the latter and its shaft provided with guiding means whereby the removable form-support may be accurately located longitudinally and circumferentially in a predetermined position on the shaft; but the former arrangement is preferred. The base 1, before it has received its coating 2, is made of an accurate predetermined shape and size and with reference to the size of the complete printing-form required. In this permanent shaping and sizing of the base the utmost possible delicacy and refinement of machine work and finish should be used to produce the best results, because it is this shaping and sizing of the base which gives shape and size to the ultimate printing-form, and the expense of the same is permissible because the shape of the base persists permanently thereafter throughout the entire life of the printing-form. The coating should be so manageable in its application that its thickness may be accurately predetermined in or-

der that the composite printing-form consisting of the base and applied coating may have an accurately-predetermined total diameter calculated with reference to the exact working position provided for in the printing-press and in the transfer-press or other mechanism to be subsequently employed in imposing upon the printing-form the design to be printed.

This invention provides a method of manipulation whereby a coating of predetermined thickness may be applied to the base in the manner and for the purpose stated. An apparatus for this purpose is shown in Fig. 4 and will now be described.

14 is a containing vessel for the electrolyte. Passing through stuffing-boxes in the opposite ends are the shafts 15 and 16, carrying the insulating-heads 17 and 18, respectively. These heads are provided with metallic spring-plates 19, whereby the heads may be centered in the ends of the tubular printing-form 1 in a firm metallic contact. The shafts 15 and 16 are adapted to support the printing-form in the electrolyte, the shaft 15 carrying a bevel-gear 20, driven by the worm-shaft 21 and geared with the shaft 16 by the shaft 21^a, which carries a gear 22, meshing with the gear 22^a on gear 20, and also a gear 23, meshing with the gear 24 on the outer end of the shaft 16. Thus the printing-form may be rotated during the deposition of its metallic coating. Alined with the shaft 15 is the screw-shaft 25, arranged for longitudinal movement and operated by the hand-wheel 26, free to turn thereon. The inner end of this screw-shaft 25 carries a head 27, adapted to enter the outer end of the shaft 15 and held loosely therein by the collar 28, loose on the shaft 25 and adapted to screw on the outer end of the shaft 15. When the shaft 25 is thus connected with the shaft 15, the latter may be moved longitudinally, so as to bring its head 17 into and out of engagement with the printing-form by rotating the hand-wheel 26, the shaft 15 moving through its stuffing-box and the gear 20, which is keyed for longitudinal movement on the shaft 15 and which is held from lateral displacement by the worm-shaft 21. The shaft 16 is similarly provided with a screw and accompanying devices. The shafts 15 and 16 are provided with brushes 29 and 30, connected to one pole of a suitable generator, insulated wires 31 and 32 connecting the contact-springs 19 with collars on which the brushes bear. The printing-form constitutes the cathode, and plates 33, consisting of the metal to be deposited, form the anodes. These plates are supported one each side of the printing-form and parallel to its axis and are both connected to the same pole of the generator. Two standards 34 are employed in connection with a pair of lifting-arms (not shown) in moving the printing-form to and from position. Zinc is the most satisfactory metal with which to coat the base in making the printing-form. Prac-

tice in carrying out this invention has demonstrated that this metal may be deposited upon the base in a uniform predetermined thickness, so that the composite printing-form when completed will exactly meet the requirements as to size and shape which adapt the printing-form to fit accurately in its working position in the transfer-press and in the printing-press constructed to receive it, so that it may be brought at once, without special adjustment, into exact predetermined relationship with the cooperating parts of such presses. For this purpose a standard of solution, of current, of time, and of character of manipulation in the bath is established experimentally, and every base is subjected to the same treatment in accordance with this standard. In effecting the deposition of the zinc upon the base the base is slowly rotated by the mechanism described, and by means of this rotation the entire surface of the base is subjected to precisely identical conditions. Variations of density in the different horizontal or vertical strata of the electrolytic solution or variations of conductivity or of capacity for carrying the metal from the anodes to the cathode, or even variation in the anode and cathode, all may exist without producing any effect upon the uniformity of the deposited coating, either as regards its porosity or thickness, the effects of such variations being counteracted by the rotation of the cylindrical base, which subjects all parts of the exterior surface of the base equally to the identical varying conditions of the electrolyte. The coating thus applied to the base is adherent, coherent, porous, absorbent, even and uniform, and admirably adapted to receive a design imparted to it or imposed upon it and to be developed into a printing-surface for such design. Moreover, this zinc coating is more pure than the flat-rolled zinc plates heretofore used for printing, and is therefore capable of producing a product of better quality. Impurities that may exist in the zinc-plate anodes, such as if present in the printing-surface would diminish the capacity of the printing-surface for good work, sink to the bottom of the bath when freed from the anodes, and thus are eliminated from the deposited coating. For planographic printing the zinc coating should be about two one-thousandths of an inch in thickness, which, under satisfactory working conditions, takes about half an hour to be deposited. If the printing-form is to be used for relief-printing, the coating will generally be made somewhat thicker. When the base has received its coating, it is removed from the bath and thoroughly washed off with water and quickly dried without much dripping or evaporation. This zinc coating adheres to the copper base, so as to be integral therewith, and yet may be quickly and completely removed by washing with dilute nitric acid and rubbing with powdered pumice-stone without removing any

part of the base. In this way, when it is desired to remove the design of a printing-surface after it has finished its work in printing, the entire zinc coating is removed and a fresh coating is applied, which will preferably be identical in thickness with the one removed and which, because of the permanent and unchanged size and shape of the base, will enable the printing-form, with its fresh coating, to fit and work in identically the same place as before. Thus a printing-form may be used over and over indefinitely and with a fresh coating and a new design whenever desired, but remaining always identical in working shape and size, and thus enabling the predetermined and precise relationship of the printing-form and its cooperating parts in the transfer and printing presses to be reliably and accurately maintained.

Referring now to the second division, I impose upon the finished printing-forms the designs to be finally printed in predetermined positions, both longitudinally and transversely or circumferentially, by the aid of fixed guiding means and with reference to the printing of said designs in accurate register, and thereby transform said printing-forms into registering printing-surfaces. I will now proceed to describe suitable means preferably employed by me for carrying out this part of the procedure.

In transforming the printing-form into a printing-surface a design is imposed upon the printing-form, generally by aid of a transfer-press and preferably by aid of a transfer-press such as shown in Figs. 5 and 6, which will now be described. The printing-forms 1, removably mounted on the support 3, which is carried by the shaft 13, have already been described in connection with Figs. 1, 2, and 3. They are shown in Fig. 6 in their proper position in the transfer-press. The shaft 13 is supported in boxes 35, adapted to slide in vertical recesses in the frame of the press and carried by the arms 36, operatively connected with the shaft 37 by cams 38. The shaft 37 is operated by the lever 39. 40 is a reciprocating bed carrying a nut 41, in which rotates the screw-shaft 42, fixed on which is a gear 43, which is driven by a gear 44. The driving-shaft 45 carries two gears 46, which may be thrown by the arm 47, operating the clutch 48, into or out of mesh with the gear 49, on opposite sides thereof. The gears 49 and 44 turn together. Thus the driving-shaft 45 may drive the bed forward and backward, the bed sliding and being guided in accurately-made slideways. The bed 40 is provided with permanently-fixed plates 50 and 51 at the rear and on one side, against which as abutments the setting-up plate is forced by the screws 52 and 53, carried on one side and at the front of the bed. The setting-up plate 54, a permanent, flat, rigid body of suitable material, such as zinc, is placed and shaped so as to fit accurately on the bed and against the abutments 50 and 51 and be firmly

held in place by the screws 52 and 53 and so that the setting-up plate may repeatedly and reliably be made to occupy exactly the same place or seat on the bed which is thus provided to receive it, the abutments 50 and 51 thus constituting guiding means whereby the setting-up plate may be always located in the same predetermined position on the bed. The bed carries on one side a rack 55, having a marked recess 56. The shaft 13 carries a gear 57, having a marked tooth 58, adapted to fit accurately in the recess 56 of the rack. The designs having been located accurately with care upon the setting-up plate by aid of suitable guide-marks or otherwise and as usually practiced in lithographic transferring, and the basic surface thereby formed having been accurately seated in its predetermined position by the aid of the guide-plates, the turning over of the designs from the basic surface upon the printing-form then proceeds. The printing-form is lowered by the arms 37 upon the basic surface always to the same point, the marked tooth 58 of the gear 57 being also carefully entered in the marked recess 56 of the rack 55, and, the requisite pressure being exerted by the arms 36, the bed 40 is moved along beneath the printing-form, which is caused to rotate thereon, and by the rolling contact thus effected the design is turned over upon the printing-form. The printing-form is caused to rotate to this end by frictional contact with the basic surface rather than by the meshing of the gear-wheel 57 with the rack 55, as the gear and rack are concerned rather in giving a fixed starting-point, always the same, for the design-transferring contact of the basic surface and printing-form, circumferentially of the printing-form, the marked tooth of the gear and the marked recess of the rack being the only essential parts of the gear and rack, respectively, and constituting fixed guiding means, whereby the basic surface and the printing-form, in conjunction with the positive supports for each, are brought into a precise predetermined cooperating relationship in the transfer-press. To insure the printing-form and its coacting basic surface and successive printing-forms and their coacting basic surfaces always beginning their contact at precisely the same starting-point, this marked tooth and marked recess are employed, thus insuring the attainment of the predetermined relationship desired. The transfer-press shown in Fig. 5 is provided with an inking-frame 59, carrying inking-rollers and centered on the shaft of a main ink-distributing roller 60, which is driven by the shaft 61, gearing with the shaft 62. The frame 59 is swung to and fro by the hand-wheel 63, which turns the gear 64, meshing with teeth cut on the frame 59. The transfer-press is also provided with a swinging damping-frame 65, carrying damping-rollers, and swung to and fro by the hand-wheel 66, which turns a gear-wheel 67, meshing with teeth cut

on the frame 65. The inking and damping rollers are used for rolling up the printing-form in the process of developing it into a printing-surface. If desired, however, the printing-form may be rolled up and developed apart from the transfer-press. In removing the printing-form from the transfer-press it is generally slipped off from its support without removing the support from the press. The development of the printing-surface may be effected by light etching, so as to make it a permanent planographic-printing surface, or it may be effected by deep etching, so as to make it a permanent relief-printing surface, or it may be developed in any suitable manner and may be routed out, if desired.

In the transformation of the printing-form into a printing-surface, as above described, many departures from the methods heretofore in use are involved. First and most important, the design has been located upon the printing-form in an exact predetermined position and with reference to the use of the printing-surface as a registering printing-surface in the printing operation. This has been effected and made possible by the employment of guiding means, whereby the basic surface (consisting of the setting-up plate and the designs thereon in the specific transfer-press described) and the printing-form are brought into a predetermined cooperating relationship with reference to register. It has also been effected in the case of the specific basic surface described by the guiding means, whereby the setting-up plate is located in an exact predetermined position on its bed. A series of printing-surfaces bearing component designs may all be made in the same way, each basic surface and its cooperating printing-form being brought into the exact predetermined cooperating relation required and at once and without delicate adjustment by the use of the guiding means, so that this series of printing-surfaces will be registering printing-surfaces constructed not only to fit in preestablished places in the transfer-press, but also constructed to fit accurately in preestablished places in the printing-press fitted to receive them, so that they will automatically print in register in such press. The basic surface itself may be made in any manner so long as it is capable of imparting by contact to the printing-form the design to be finally printed. Again, the imposition of the designs upon the printing-forms has been effected by rolling contact, (instead of by the contact of one surface upon another under the pressure of a scraper,) the printing-form rotating in bearings which are fixed.

It is often of importance to be able to make interchangeable duplicate printing-surfaces either to take the place of those worn out in printing a job or where the job is of such magnitude as to require the simultaneous employment of duplicate printing-surfaces. This invention contemplates a method of making such duplicate printing-surfaces

each from a previously-prepared printing-surface, whereby the careful and skilful hand-work required in preparing the original basic surface is eliminated as regards each duplicate printing-surface. In carrying out this part of the invention a permanent printing-surface, which may be termed the "primary" printing-surface, is prepared in any suitable manner, so as to be capable of printing, and may be and preferably is prepared by the aid of an original basic surface, as already described. The primary printing-surface is then brought into proper relation with a printing-form, which may be called the "secondary" printing-form, and the design of the former is imparted to the latter either by direct contact therewith or through the intermediation of a suitable positive-related conveying-surface, and the secondary printing-form is then developed into a printing-surface which may be then termed the "secondary" printing-surface. As many of these secondary surfaces may be made as desired, all having their designs identically placed thereon and all being identical in size and shape, so as to be interchangeable with each other. Thus from a series of registering primary printing-surfaces a series or a plurality of series of registering secondary surfaces may be made. In carrying out this operation, so as to produce registering secondary printing-surfaces or so as to produce a secondary printing-surface which will be a duplicate of the primary printing-surface, pre-established permanent seats for such surfaces and for the conveying-surfaces are provided in a machine in which said surfaces accurately fit, and guiding means are employed whereby these surfaces may be brought into predetermined coöperating relationship for the purpose of attaining the predetermined location of the design on the secondary printing-surface required in order that it may automatically register in printing.

In Fig. 7 a primary printing-surface, a conveying-surface, and a secondary printing-form are shown in position such as they would occupy in a suitable machine. The printing-form 1, already developed into a printing-surface, as described, is now the primary printing-surface. It is removably mounted on a supporting-cylinder 68, identical with the supporting-cylinder 3, heretofore described, and is located and locked thereon in a predetermined position by the guiding means identical with those described with reference to Figs. 1 and 2. 69 is the secondary printing-form to be transformed into the secondary printing-surface identical and interchangeable with the printing-surface 1. It is identical in size, shape, and character of material with the printing-surface 1 and is identically mounted upon a supporting-cylinder 70, identical with the cylinder 68. 71 is a drum carrying a conveying-surface 72, preferably made of rubber and permanently

attached to said drum. The cylinders 68 and 69 and the drum 71 are respectively provided with fixed gear-wheels 73, 74, and 75. A tooth and a recess of the gears 73 and 75 are marked so that one fits accurately in the other when the printing-surface and the conveying-surface are brought into operating contact, and a tooth and recess of the gears 74 and 75 are marked so that one may accurately fit in the other when the secondary printing-form 69 and the conveying-surface are brought into operating contact. These marked teeth and recesses constitute guiding means whereby the primary printing-surface and the conveying-surface and the secondary printing-form may be brought accurately into predetermined relationship with reference to the required location of the design to be imparted to the secondary printing-form, so as to make it a registering printing-surface. When the primary printing-surface, suitably inked, and the conveying-surface are brought into firm contact and caused to roll the one against the other, an impression is imparted from the former to the latter. The conveying-surface and the secondary printing-form are then brought into firm contact and the impression on the former is imparted to the latter. The secondary printing-form is then suitably developed into a printing-surface for that design and is identical and interchangeable with the primary printing-surface. The gear-wheels 73, 74, and 75 are not employed for the purpose of communicating motion from one surface to the other, but rather because, taken in conjunction with the positive lateral supports, they are convenient in providing by their marked teeth and recesses the guiding means required, as already described. Motion is conveyed from one surface to the other by the friction engendered by the firm contact of these surfaces, the one with another, as described. It will be observed that the conveying-surface 72 in its relation to the secondary printing-form 74 is a basic surface. Instead of fixing the conveying-surface upon a rotary drum, as described, it may be fixed upon a reciprocating bed.

Referring now to the third division of procedure, I arrange the said printing-forms, with the designs imposed upon them, in their pre-established seats in a printing-press and in predetermined relationship with reference to each other, suitably-fixed guiding means being employed to enable this predetermined relationship to be at once attained both longitudinally and transversely or circumferentially and without the usual empiric adjustment. I am thereby enabled to print from said printing-surfaces in accurate register and in approximately instantaneous succession. I will now proceed to describe suitable means preferably employed by me for carrying out this part of my invention.

When a series of registering printing-surfaces have been completed, they are then

ready to be used in printing. For this purpose a printing-press is provided which may be of any suitable construction—for example, such as that shown in Fig. 8—having therein preestablished seats for the series of printing-surfaces, so that when the printing-surfaces are mounted therein they may print at once in accurate register, guiding means being employed for the purpose of bringing each printing-surface at once into the required and exact predetermined relation to the other printing-surfaces.

The press shown in Fig. 8 is a sixteen-color press, and it is constructed and designed to print in rapid succession sixteen registered component impressions in as many colors and on the web. 76 is the impression-drum, having a uniformly elastic and resistant surface and carried on a shaft centered in bearings in the main frame 77. This drum carries a gear 78, which meshes with identical gears 79, carried with the sixteen supporting-cylinders 80, which are supported to rotate in fixed bearings provided in the main frame and surrounding the impression-drum. The supporting-cylinders 80 are identical in size and shape with each other and are all preferably identical with the form-cylinder 3. (Shown in Figs. 1 and 2.) They all carry removable cylindrical printing-surfaces 1 81 82, &c., which bear registering component designs and which are designed and adapted to register in printing. The supporting-cylinders 80 are each fixed to shafts 83, supported in sliding boxes 84, fitting in recesses in the main frame. Each pair of boxes 84 is provided with a pair of arms 85, one on each side of the press and which have their outer ends connected to the boxes and their inner ends connected for reciprocating movement by suitable means with an annular plate 86, bolted to an arm 87, turning on the hub of the shaft of the impression-drum. This arm is operated by suitable means, and when turned in one direction the radial arms 85 for all the printing-surfaces are moved outward, so as to carry the printing-surfaces out of contact with the impression-surface, and when the arm 87 is turned in the opposite direction the printing-surfaces are all brought into contact with the impression-surface. Each printing-surface is provided with inking and damping frames carrying inking and damping rollers, respectively, as shown. 88 is the roll of paper which constitutes the web impression-surface and which is fed around the impression-drum, so as to receive the impressions of the printing-surfaces each in turn and in rapid succession and in accurate automatic register. For the purpose of attaining this register accurately and at once each gear 79 has a marked tooth designed and adapted to enter a marked recess of the gear 78 when that marked recess reaches it in the original adjusting revolution of the drum, this with the positive seating of the printing-surfaces constituting the guiding means for bringing the

printing-surfaces into the required exact predetermined relation with respect to each other.

Referring now Fig. 9, the supporting-cylinders 68 and 70 are carried on shafts 87 and 88, mounted in sliding boxes 89, arranged to move in the slideways 90, formed in the frame of the machine, whereby the printing-surface 1 and the printing-form 69 on said supporting-cylinders may be moved into and out of contact with the conveying-surface 72 on the drum 71. The printing-form 69 is provided with a vertically-moving inking-frame 90, arranged by suitable mechanism actuated by the hand-wheel 91 to be moved to and from the printing-form, so that the printing-form may be rolled up in the machine after it has received its impression from the conveying-surface. The printing-form 69 is also provided with a vertical-moving damping-frame actuated by the hand-wheel 92. The printing-surface 1 is provided with inking and damping frames 93 and 94, respectively, similar to those employed in connection with the printing-form 69. 95 is a lever having at its inner end a segmental rack engaging a rack 96, fixed on a shaft 97, which carries cams 98, engaging levers 99, pivoted on opposite sides of the machine. The upper ends of these levers carry arms 100, which engage the ends of the shaft 88. The operation of the arm 95 moves the shaft 88 and with it the supporting-cylinders and supporting-frame carried thereon. Similar means are provided for moving the shaft 87 and the supporting and printing-surface carried thereby. 101 is a pulley on the driving-shaft, whereby the drum 71 is driven and with it the printing-surfaces 73 or the printing-form 69 when either of these is in contact with the conveying-surface.

In the practical use of this invention much of the work will be done with printing-surfaces which are graduated—that is to say, the printing-surfaces will be so prepared as to make impressions in which the ink will be distributed in graduated quantities for light and shade effects, depth of color, &c. These graduated printing-surfaces will be employed in nearly all cases where pictures are to be printed, and the designs on the printing-surfaces will generally be prepared so as to print overlapping impressions.

While the various marked advantages of this invention will be especially available in rotary printing, yet it is to be noted that certain advantages of the invention may be availed of in connection with flat printing-surfaces and a reciprocating printing-press, so that the invention is not to be restricted in all cases to rotary printing.

The electrolytic bath apparatus shown in Fig. 4 is the subject of a special application filed by me on January 13, 1897, Serial No. 619,041, and the same is not herein claimed alone and separately considered.

The transfer-press shown in Figs. 5 and 6 is the subject of special applications filed by me

on January 23, 1899, Serial No. 703,082, and on October 4, 1899, Serial No. 732,437, and the same is not herein claimed alone and separately considered.

5 The transfer-press shown in Figs. 7 and 9 is the subject of special applications filed, respectively, by me October 4, 1899, Serial Nos. 732,439 and 732,440, and January 5, 1899, Serial No. 701,192, and the same is not herein
10 claimed alone and separately considered.

The printing-press shown in Fig. 8 is the subject to a special application filed by me on June 1, 1896, Serial No. 593,796, and the same is not herein claimed alone and separately considered.
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In alluding to the positions of the printing-forms on their respective supports and to their coöperating relation and to the coöperating relation of the conveying-surface I use
20 the terms "longitudinally" and "transversely" as referring to the two directions at right angles to each other over said bodies, whether either or both of these bodies is flat or curved. If the body is curved, longitudinal would refer to axial direction and transverse to circumferential direction.
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The method of electrolytically depositing the coating upon the base shown and described herein with reference to the electrolytic bath is not herein separately claimed,
30 such method being made the subject of a separate application executed and filed by me simultaneously herewith.

What I claim as new, and desire to secure by Letters Patent, is—
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1. The improvement in the art of multi-color-printing, which consists in preparing a series of metallic bases for printing-forms, said printing-forms being made of a predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press, and work accurately with the coöperating parts of the printing-press; applying to each base by electrodeposition a metallic coating of suitable thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon
40 said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the
45 printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.
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2. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudinally and transversely, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the coöperating parts of the printing-press; revolving each base in an electrolytic bath thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment.
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3. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the coöperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces.
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4. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic printing-forms having planographic surfaces suitable to receive designs and to be developed into printing-surfaces therefor, and also a series of rotary form-supports for said printing-forms, said forms and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press, imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

5. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in

their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

6. The improvement in the art of multi-color-printing, which consists in preparing a series of curved metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

7. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic metallic continuous seamless zinc coating of predetermined thickness, integral with the base and

suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

8. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

9. The improvement in the art of multi-color-printing, which consists in preparing a

series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

10. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering

printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

11. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms having planographic surfaces suitable to receive designs and to be developed into printing-surfaces therefor, said printing-forms being made of a predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press, and so that the printing-forms are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

12. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudi-

nally and circumferentially by the aid of the fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

13. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

14. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size

and shape to adapt them to accurately fit, removably and replaceably, one upon another, in predetermined relationship both longitudinally and transversely, and so that the form-supports are adapted to accurately fit in pre-established seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

15. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and cir-

cumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

16. The improvement in the art of multi-color-printing which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape and having fixed mechanical guides to adapt them to accurately fit, removably and replaceably, one upon another, in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

17. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape and having fixed mechanical guides to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms

carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

18. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms of predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press, and to fit and work accurately with the cooperating parts of the printing-press; preparing a series of registering basic surfaces bearing component designs and on a rigid base of predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and transversely with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing, arranging said printing-surfaces in their predetermined positions in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

19. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent prede-

termined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register; suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to the other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

20. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of

said component designs in accurate register; suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its predetermined seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

21. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation, and to be employed in printing registering impressions.

22. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral

with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation, and to be employed in printing registering impressions.

23. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-forms; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register; suitably developing and thereby transforming said printing-forms into registering printing-surfaces; of the character desired adapted to be mounted at once in said printing-press in registering relation, and to be employed in printing registering impressions.

24. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumfer-

ententially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms
 5 into registering printing-surfaces; arranging said printing-surfaces, each in turn as a primary printing-surface, in predetermined co-operating relationship with a corresponding secondary printing-form, and by the aid of
 10 fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-form in predetermined position with reference to register, said secondary printing-forms being identical with
 15 the primary printing-surfaces in their adaptability to accurately fit removably and replaceably on said form-supports; suitably developing said secondary printing-forms into printing-surfaces of the character desired
 20 and thereby transforming said secondary printing-forms into a series of registering secondary printing-surfaces; arranging said secondary printing-surfaces in predetermined positions on their form-supports for the print-
 25 ing-press, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to the others, fixed guiding means being employed whereby this predetermined relation-
 30 ship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

25. The improvement in the art of multi-
 35 color-printing, which consists in preparing a series of curved tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-sup-
 40 ports being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudi-
 45 nally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the coöperating parts of the printing-press; imposing a series of
 50 component designs upon another series of printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in
 55 accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces, each in turn as a primary printing-surface, in predetermined coöperating relationship
 60 with one of said first-mentioned printing-forms arranged as a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary
 65 printing-form in predetermined position with reference to register, suitably developing said secondary printing-forms, into printing-sur-

faces of the character desired and thereby transforming said secondary printing-forms into a series of registering secondary print-
 70 ing-surfaces; arranging said secondary printing-surfaces in predetermined positions on said form-supports for the printing-press, each support being mounted in its preestab-
 75 lished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relation-
 80 ship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

26. The improvement in the art of multi-
 85 color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predeter-
 90 mined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accu-
 95 rately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the coöperating parts of the printing-press, revolving each
 100 base in a zinc electrolytic bath and thereby applying to it by electrodeposition a plano-graphic continuous, seamless zinc coating of predetermined thickness, integral with the
 105 base and suitable to have imposed upon it and to print a design, said coating being removable from the base and renewable thereon without substantially affecting the pre-
 110 determined size and shape of the base; imposing a series of component designs upon another series of printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means
 115 and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces, arranging said printing-surfaces, each in turn as a
 120 primary printing-surface, in predetermined coöperating relationship with one of said first-mentioned printing-forms arranged as a corresponding secondary printing-form, and by the aid of fixed guiding means, and im-
 125 parting the design of the primary printing-surface to the secondary printing-form in predetermined position with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-sur-
 130 faces of the character desired and thereby transforming said secondary printing-forms into a series of registering secondary printing-surfaces; arranging said secondary printing-surfaces in predetermined positions on said form-supports for the printing-press, each support being mounted in its preestab-

lished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

27. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; turning over a series of transfer-sheets bearing component designs upon another series of printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register; arranging said printing-surfaces, each in turn as a primary printing-surface, in predetermined cooperating relationship with one of said first-mentioned printing-forms arranged as a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-form in predetermined position with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into a series of registering secondary printing-surfaces; arranging said secondary printing-surfaces in predetermined positions on said form-supports for the printing-press, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to the other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

28. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent

predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon another series of printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces, each in turn as a primary printing-surface, in predetermined cooperating relationship with one of said first-mentioned printing-forms arranged as a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-form in predetermined position with reference to the register, suitably developing said secondary printing-forms, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into a series of registering secondary printing-surfaces adapted to be mounted on said form-supports in said printing-press, and at once in registering relation, and to be employed in printing registering impressions.

29. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed

guiding means and with reference to the printing of said component designs in accurate register; suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces, each in turn as a primary printing-surface, in predetermined cooperating relationship with a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-form in predetermined position with reference to the register, said secondary printing-forms being identical with the primary printing-surfaces; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into a series of registering secondary printing-surfaces adapted to be mounted on said form-supports in said printing-press, and at once in registering relation, and to be employed in printing registering impressions.

30. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon another series of printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces, as primary printing-surfaces, and said first-mentioned printing-forms as secondary printing-forms in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumferentially on a rotary form-support, said form-supports being mounted in preestablished seats in said press; imparting the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired

and thereby transforming said secondary printing-form into registering secondary printing-surfaces; arranging said secondary printing-surfaces in predetermined position on said form-supports for the press each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

31. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces as primary printing-surfaces, and a series of secondary printing-forms in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumferentially on a rotary form-support, said form-support being mounted in preestablished seats in said press; imparting by rolling contact the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms into printing-surfaces of the character desired and thereby transforming said secondary

printing-forms into registering secondary printing-surfaces; arranging said secondary printing-surfaces in predetermined positions on said form-supports for the printing-press, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

32. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms of predetermined size and shape to adapt them to accurately fit in preestablished seats in a transfer-press, and so that the printing-forms are adapted to fit and work accurately with the cooperating parts of said press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces, as primary printing-surfaces, and a series of secondary printing-forms in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, said secondary printing-forms being made of predetermined size and shape to adapt them to accurately work and fit in preestablished seats in a printing-press; imparting the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms into registering secondary printing-surfaces.

33. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the print-

ing of said component designs in accurate register; suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces, as primary printing-surfaces, and a series of secondary printing-forms in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumferentially on a rotary form-support, said form-supports being mounted in preestablished seats in said press; imparting the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into registering secondary printing-surfaces; arranging said secondary printing-surfaces in predetermined positions on said form-supports, for the printing-press each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

34. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; arranging said printing-forms, as secondary printing-forms, and a series of primary printing-surfaces having component designs in a transfer-press, a primary printing-surface and a secondary printing-form together, each primary printing-surface and each secondary printing-form being re-

movably mounted by the aid of fixed guiding means in a predetermined position longitudinally and transversely on a form-support, said form-supports being mounted in preestablished seats in said press; imparting the design of each primary printing-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation and to be employed in printing registering impressions.

35. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms of predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press, and so that the printing-forms are adapted to fit and work accurately with the cooperating parts of the printing-press; arranging said printing-forms, as secondary printing-forms, and a series of primary printing-surfaces having component designs in a transfer-press, a primary printing-surface and a secondary printing-form together, each primary printing-surface and each secondary printing-form being removably mounted in said press by the aid of fixed guiding means in predetermined cooperating relation both longitudinally and transversely; imparting the design of each primary printing-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-form, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation and to be employed in printing registering impressions.

36. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to fit accurately in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it

and to print a design, said coating and its base constituting the printing-form; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces, as primary printing-surfaces, and a series of secondary printing-forms in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumferentially on a rotary form-support, said form-supports being mounted in preestablished seats in said press; imparting by rolling contact the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation and to be employed in printing registering impressions.

37. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon; arranging said printing-forms, as secondary printing-forms and a series of primary printing-surfaces having component designs in a transfer-press having a conveying-sur-

face, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumferentially on a rotary form-support, said form-supports being mounted in preestablished seats in said press; imparting the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transferring said secondary printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation and to be employed in printing registering impressions.

38. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; preparing a series of registering basic surfaces bearing component designs and on a rigid base of predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing, and adapted to be mounted at once in said printing-press in registering relation and to

be employed in printing registering impressions.

39. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape and adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined positions for the purpose of register in printing; arranging said printing-surfaces, each in turn as a primary surface, in predetermined cooperating relationship with a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-forms in predetermined position with reference to register, said secondary printing-forms being identical with the primary printing-surfaces in their adaptability to accurately fit removably and replaceably on said form-supports; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into a series of registering printing-surfaces; arranging said secondary printing-surfaces in predetermined positions on said form-supports for the printing-press, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship

with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

40. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic printing-forms and also a series of rotary form-supports therefor, said printing-forms and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces, each in turn as a primary printing-surface in predetermined cooperating relationship with a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-form in predetermined position with reference to register, said secondary printing-forms being identical in size with the primary printing-surfaces in their adaptability to accurately fit removably and replaceably on said form-supports; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into a series of registering printing-surfaces, adapted to be mounted at once in said printing-press in registering relation and to be employed in printing registering impressions.

41. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary

form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms, as by etching, into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces in predetermined positions on the form-supports for said printing-press, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

42. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to fit and work accurately in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to accurately fit and work with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby ap-

plying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported in a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined positions for the purpose of register in printing; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

43. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; turning over a series of transfer-sheets

bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; suitably developing said printing-forms into printing-surfaces of the character desired; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, in predetermined relationship with reference to the impression-surface and with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

44. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon the other in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing, and adapted to be

mounted at once in said printing-press in registering relation and to be employed in printing registering impressions.

45. The improvement in the art of multi-
 5 color-printing, which consists in preparing a series of tubular metallic printing-forms and also a series of rotary form-supports therefor, said printing-forms and form-supports being made of a permanent predetermined size and
 10 shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in prees-
 15 tablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; turning over a series of trans-
 20 fer-sheets bearing registering basic surfaces having component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of
 25 said printing-forms in turn, and supported on a rotary form-support in said transfer-press in an accurate predetermined relation both longi-
 30 tudinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic sur-
 35 faces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon be-
 40 come registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined
 45 position for the purpose of register in printing, and adapted to be mounted at once in said printing-press in registering relation and to be employed in printing registering impres-
 50 sions.

46. The improvement in the art of multi-
 45 color-printing which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and
 50 form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit, removably and replaceably, and one upon another in predetermined relation both longitudinally and circumferen-
 55 tially, and so that the form-supports are adapted to securely fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the
 60 cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral
 65 with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form,

and the coating being removable from the base and renewable thereon without substan-
 70 tially affecting the predetermined permanent size and shape of the base; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted
 75 to fit accurately in a preestablished seat in a transfer-press, arranging each of said printing-forms in turn, and supported on a rotary form-support, in said transfer-press in an accurate predetermined relation both longitu-
 80 dinally and circumferentially with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic sur-
 85 faces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether
 90 planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces, each in turn as a primary printing-surface,
 95 in predetermined cooperating relationship with a corresponding secondary printing-form, and by the aid of fixed guiding means, and imparting the design of the primary printing-surface to the secondary printing-form in
 100 predetermined position with reference to register, said secondary printing-forms being identical with the primary printing-surfaces in their adaptability to accurately fit removably and replaceably said form-supports; suit-
 105 ably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into a series of registering printing-surfaces.

47. The improvement in the art of multi-
 110 color-printing, which consists in preparing a series of curved identical metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent prede-
 115 termined size and shape to adapt them to accurately fit, removably and replaceably, one upon another both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished
 120 seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electro-
 125 lytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its
 130 base constituting the printing-form and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and

shape of the base; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

48. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic metallic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may

be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

49. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape and having fixed mechanical guides to adapt them to accurately fit removably and replaceably one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous, seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; turning over a series of transfer-sheets bearing component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, suitably developing and thereby transforming said printing-forms into registering printing-surfaces of the character desired; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to the impression-surface and with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

50. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor; said bases and form-supports being made of a permanent predetermined size and shape and having fixed mechanical guides to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accu-

5 rarely fit in preestablished seats in a rotary
 printing-press, and so that the printing-forms
 carried on their form-supports are adapted to
 fit and work accurately with the cooperating
 10 parts of the printing-press; revolving each
 base in a zinc electrolytic bath and thereby
 applying to it by electrodeposition a plano-
 graphic continuous seamless zinc coating of
 predetermined thickness, integral with the
 15 base and suitable to have imposed upon it
 and to print a design, said coating and its
 base constituting the printing-form, and the
 coating being removable from the base and
 renewable thereon without substantially af-
 20 fecting the predetermined permanent size and
 shape of the base; preparing a series of reg-
 istering basic surfaces bearing removable
 transfer-sheets having component designs
 and on a rigid base of permanent predeter-
 25 mined size and shape adapted to fit accurately
 in a preestablished seat in a transfer-press;
 arranging each of said printing-forms in turn,
 and supported on a rotary form-support, in
 said transfer-press in an accurate predeter-
 30 mined relation both longitudinally and cir-
 cumferentially with respect to its correspond-
 ing basic surface seated in said press, and by
 the aid of fixed guiding means, the same for
 the entire series; turning over and thereby
 35 imparting by rolling contact the designs of
 the basic surfaces to the printing-forms; suit-
 ably developing said printing-forms, as by
 etching, into printing-surfaces which will
 thereupon become registering printing-sur-
 40 faces for said designs and of the character de-
 sired, whether planographic, relief or intaglio,
 and having their designs located thereon in
 predetermined position for the purpose of
 register in printing; arranging said print-
 45 ing-surfaces in their predetermined position
 on their form-supports, each support being
 mounted in its preestablished seat in the
 printing-press, and bringing said printing-
 surfaces into predetermined relationship with
 50 reference to each other, fixed guiding means
 being employed whereby this predetermined
 relationship may be at once attained both lon-
 gitudinally and circumferentially and with-
 out the usual empiric adjustment; and print-
 ing from said printing-surfaces in accurate
 register in approximately instantaneous suc-
 cession.

51. The improvement in the art of multi-
 color-printing, which consists in preparing a
 55 series of curved identical tubular metallic
 bases for printing-forms and also a series of
 rotary form-supports therefor; said bases
 and form-supports being made of a perma-
 nent predetermined size and shape and hav-
 60 ing fixed mechanical guides to adapt them to
 accurately fit, removably and replaceably,
 one upon another in predetermined relation
 both longitudinally and circumferentially,
 and so that the form-supports are adapted to
 65 accurately fit in preestablished seats in a ro-
 tary printing-press, and so that the printing-
 forms carried on their form-supports are

adapted to fit and work accurately with the
 cooperating parts of the printing-press; re-
 70 volving each base in a zinc electrolytic bath
 and thereby applying to it by electrodeposi-
 tion a planographic continuous seamless zinc
 coating of predetermined thickness, integral
 with the base and suitable to have imposed
 upon it and to print a design, said coating 75
 and its base constituting the printing-form,
 and the coating being removable from the
 base and renewable thereon without sub-
 stantially affecting the predetermined perma-
 80 nent size and shape of the base; preparing a
 series of registering basic surfaces bearing
 removable transfer-sheets having component
 designs and on a rigid base of permanent
 predetermined size and shape adapted to
 fit accurately in a preestablished seat in a 85
 transfer-press; arranging said printing-sur-
 faces, as primary printing-surfaces, and a
 series of secondary printing-forms in a trans-
 fer-press having a conveying-surface, a pri-
 90 mary printing-surface, a secondary printing-
 form and a conveying-surface together, each
 primary printing-surface and each secondary
 printing-form being removably mounted by
 the aid of fixed guiding means in a prede-
 95 termined position longitudinally and cir-
 cumferentially on a rotary form-support,
 said form-supports being mounted in pre-
 established seats in said press; imparting by
 rolling contact the design of each primary
 printing-surface to a conveying-surface and 100
 from the conveying-surface to a secondary
 printing-form, guiding means being employed
 whereby said designs are imparted to the
 secondary printing-forms in accurate prede-
 105 termined positions and with reference to reg-
 ister; suitably developing said secondary
 printing-form, as by etching, into printing-
 surfaces of the character desired and thereby
 transforming said secondary printing-forms
 into registering secondary printing-surfaces; 110
 arranging said secondary printing-surfaces
 in predetermined positions on said form-
 supports for the printing-press, each sup-
 port being mounted in its preestablished
 seat in the printing-press, and bringing said 115
 printing-surfaces into predetermined rela-
 tionship with reference to each other, fixed
 guiding means being employed whereby this
 predetermined relationship may be at once
 attained both longitudinally and circumfer- 120
 entially and without the usual empiric ad-
 justment; and printing from said printing-
 surfaces in accurate register and approxi-
 mately instantaneous succession.

52. The improvement in the art of multi- 125
 color-printing, which consists in preparing a
 series of curved identical shell-like metallic
 printing-forms and also a rotary form-sup-
 port therefor, said printing-forms and form-
 support being made of a predetermined size 130
 and shape to adapt them to accurately fit one
 upon another, and so that the form-support
 is adapted to accurately fit in a preestablished
 seat in a rotary printing-press, and so that a

printing-form carried on the form-support is adapted to fit and work accurately with the cooperating parts of the printing-press; arranging said printing-forms, each in turn as
 5 a secondary printing-form in a transfer-press having a primary printing-surface, a primary printing-surface and a secondary printing-form together, each secondary printing-form being removably mounted by the aid of fixed
 10 guiding means in a predetermined position on a rotary form-support, said form-support being mounted in a preestablished seat in said transfer-press; imparting the design of said primary printing-surface to said secondary
 15 printing-forms, guiding means being employed whereby said primary printing-surface, and said secondary printing-forms are brought into precise cooperating relation for the purpose of imparting the design of the
 20 primary surface to the secondary printing-forms in accurate predetermined positions and with reference to the use of each of the secondary printing-forms, when developed, as a registering printing-surface; and suit-
 25 ably developing and thereby transforming said secondary printing-forms, as by etching, into secondary printing-surfaces of the character desired, whether planographic, relief or intaglio, whereby a series of duplicate print-
 30 ing-surfaces is produced identical and interchangeable on the same form-support mounted in a printing-press.

53. The improvement in the art of multi-color-printing, which consists in preparing a
 35 series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent prede-
 40 termined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-
 45 press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in
 50 an electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have im-
 55 posed upon it and to print a design, said coating and its base constituting the printing-form; arranging said printing-forms, as secondary printing-forms, and a series of regis-
 60 tering primary printing-surfaces in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each
 65 primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumfer-
 65 seats in said press; imparting by rolling contact the design of each primary printing-surface to a conveying-surface and from the con-

veying-surface to a secondary printing-form, guiding means being employed whereby said
 designs are imparted to the secondary print- 70
 ing-forms in accurate predetermined posi-
 tions and with reference to register; suitably developing said secondary printing-forms, as
 by etching, into printing-surfaces of the char- 75
 acter desired and thereby transforming said
 secondary printing-forms into registering sec-
 ondary printing-surfaces; arranging said sec-
 ondary printing-surfaces in their predeter-
 mined positions on said form-supports for the
 printing-press, each support being mounted in 80
 its preestablished seat in the printing-press,
 and bringing said printing-surfaces into pre-
 determined relationship with reference to each
 other, fixed guiding means being employed
 whereby this predetermined relationship may 85
 be at once attained both longitudinally and
 circumferentially and without the usual em-
 piric adjustment; and printing from said
 printing-surfaces in accurate register in ap-
 proximately instantaneous succession. 90

54. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic printing-forms and also a series of rotary form-sup-
 ports therefor, said printing-forms and form- 95
 supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished
 seats in a rotary printing-press, and so that 100
 the printing-forms carried on their form-sup-
 ports are adapted to fit and work accurately with the cooperating parts of the printing-
 press; arranging said printing-forms, as sec- 105
 ondary printing-forms, and a series of regis-
 tering primary printing-surfaces in a trans-
 fer-press having a conveying-surface, a pri-
 mary printing-surface, a secondary printing-
 form and a conveying-surface together, each 110
 primary printing-surface and each secondary
 printing-form being removably mounted by
 the aid of fixed guiding means in a predeter-
 mined position longitudinally and circumfer- 115
 entially on a rotary form-support, said form-
 supports being mounted in preestablished
 seats in said press; imparting by rolling con-
 tact the design of each primary printing-
 surface to a conveying-surface and from the
 conveying-surface to a secondary printing- 120
 form, guiding means being employed where-
 by said designs are imparted to the secondary
 printing-forms in accurate predetermined po-
 sitions and with reference to register; suit-
 ably developing said secondary printing- 125
 forms, as by etching, into printing-surfaces
 of the character desired and thereby trans-
 forming said secondary printing-forms into
 registering secondary printing-surfaces.

55. The improvement in the art of multi-color-printing, which consists in preparing a 130
 series of curved identical tubular metallic
 bases for printing-forms and also a rotary
 form-support therefor, said bases and form-
 support being made of a predetermined size

and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-support is adapted to accurately fit in a preestablished seat in a rotary printing-press, and so that a printing-form carried on the form-support is adapted to work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous seamless zinc coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined permanent size and shape of the base; arranging said printing-forms, each in turn as a secondary printing-form in a transfer-press having a primary printing-surface and a conveying-surface, a primary printing-surface, a conveying-surface, and a secondary printing-form together, each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position on a rotary form-support, said form-support being mounted in a preestablished seat in said transfer-press; imparting the design of said primary printing-surface to said conveying-surface and by rolling contact from said conveying-surface to said secondary printing-forms, guiding means being employed whereby said primary printing-surface, and conveying-surface and said secondary printing-forms are brought into the same precise cooperating relation for the purpose of imparting the design of the primary surface to the secondary printing-forms in accurate predetermined positions and with reference to the use of each of the secondary forms, when developed, as a registering printing-surface; and suitably developing and thereby transforming said secondary printing-forms, as by etching, into secondary printing-surfaces of the character desired, whether planographic, relief or intaglio, whereby a series of duplicate printing-surfaces is produced identical and interchangeable on the same form-support mounted in a printing-press.

56. The improvement in the art of multi-color-printing, which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent and predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and transversely, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are

adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic metallic coating of predetermined thickness, integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; arranging said printing-forms as secondary printing-forms and a series of registering primary printing-surfaces in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and circumferentially on a rotary form-support, said form-supports being mounted in preestablished seats in said press; imparting by rolling contact the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in an accurate predetermined position and with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into registering secondary printing-surfaces; arranging said secondary printing-surfaces in their predetermined positions on said form-supports for the printing-press, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may at once be attained both longitudinally and circumferentially and without the usual empiric adjustments; and printing from said printing-surfaces in accurate register in approximately instantaneous succession.

57. The improvement in the art of multi-color-printing which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit, removably and replaceably, one upon another in predetermined relation both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; revolving each base in a zinc electrolytic bath and thereby applying to it by electrodeposition a planographic continuous seamless zinc coating of predetermined thickness, integral with the

base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form, and the coating being removable from the base and renewable thereon without substantially affecting the predetermined size and shape of the base; arranging said printing-forms, secondary printing-forms and a series of registering primary printing-surfaces in a transfer-press having a conveying-surface, a primary printing-surface, a secondary printing-form and a conveying-surface together, each primary printing-surface and each secondary printing-form being removably mounted by the aid of fixed guiding means in a predetermined position longitudinally and transversely on a form-support, said form-supports being mounted in preestablished seats in said press; imparting the design of each primary printing-surface to a conveying-surface and from the conveying-surface to a secondary printing-form, guiding means being employed whereby said designs are imparted to the secondary printing-forms in accurate predetermined positions and with reference to register; suitably developing said secondary printing-forms, as by etching, into printing-surfaces of the character desired and thereby transforming said secondary printing-forms into registering secondary printing-surfaces.

58. The improvement in the art of multi-color-printing which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably one upon another in predetermined relationship both longitudinally and circumferentially, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; applying to each base a planographic metallic coating integral with the base and suitable to have imposed upon it and to print a design said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and bringing said printing-surfaces into predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual em-

piric adjustments; and printing from said printing-surfaces in accurate register.

59. The improvement in the art of multi-color-printing which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; applying to each base a planographic metallic coating integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting a printing-form and the coating being removable from the base and renewable thereon without substantially affecting the predetermined size and shape of the base; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

60. The improvement in the art of multi-color-printing which consists in preparing a series of curved identical tubular metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; applying to each base a planographic zinc coating integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-sur-

faces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and circumferentially and without the usual empiric adjustment; and printing from said printing-surfaces in accurate register.

61. The improvement in the art of multi-color-printing, which consists in preparing a series of curved shell-like metallic bases for printing-forms and also a series of rotary form-supports therefor, said bases and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a rotary printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the press; applying to each a planographic metallic coating integral with the base and suitable to have imposed upon it and to print a design, said coating and its base constituting the printing-form; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and circumferentially by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces adapted to be mounted at once in said printing-press in registering relation, and to be employed in printing registering impressions.

62. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms, each having a surface suitable to have imposed upon it, and to print, a design, said printing-forms being made of a predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press and to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their preestablished seats in the printing-press in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

63. The improvement in the art of multi-

color-printing, which consists in preparing a series of printing-forms, each having a surface suitable to have imposed upon it, and to print, a design, said printing-forms being made of a predetermined size and shape to adapt them to accurately fit removably and replaceably in predetermined relation both longitudinally and transversely in preestablished seats in a printing-press and to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their preestablished seats in the printing-press in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

64. The improvement in the art of multi-color-printing which consists in preparing a series of tubular printing-forms each having a surface suitable to have imposed upon it, and to print, a design, and also a series of rotary form-supports therefor, said printing-forms and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

65. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms, each having a surface suitable to have imposed upon it, and to print, a design, said printing-form being

made of a predetermined size and shape and having fixed mechanical guides to adapt them to accurately fit removably and replaceably in predetermined relation both longitudinally and transversely in preestablished seats in a rotary printing-press and to fit and work accurately with the cooperating parts of the printing-press, imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register and thereby transforming said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their preestablished seats in the printing-press in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

66. The improvement in the art of multi-color-printing, which consists in preparing a series of tubular printing-forms, each having a surface suitable to have imposed upon it, and to print, a design, and also a series of rotary form-supports therefor, said printing-forms and form-supports being made of a predetermined size and shape and having fixed mechanical guides to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; imposing a series of component designs upon said printing-forms in predetermined positions both longitudinally and transversely by the aid of fixed guiding means and with reference to the printing of said component designs in accurate register, and thereby transform said printing-forms into registering printing-surfaces; arranging said printing-surfaces in their predetermined positions on their form-supports, each support being mounted in its preestablished seat in the printing-press, and in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

67. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms, each having a planographic surface suitable to have imposed upon it, and to print, a design, said printing-forms being made of a predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press and to fit and

work accurately with the cooperating parts of the printing-press; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn in said transfer-press in an accurately-predetermined relation both longitudinally and transversely with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting the design of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces in their predetermined positions, each in its preestablished seat in the printing-press, in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be attained and the printing may be done in approximately instantaneous succession.

68. The improvement in the art of multi-color-printing, which consists in preparing a series of tubular printing-forms, each having a planographic surface suitable to have imposed upon it, and to print, a design, and also a series of rotary form-supports therefor, said printing-forms and form-supports being made of a predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; preparing a series of registering basic surfaces bearing component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn in said transfer-press in an accurate predetermined relation both longitudinally and transversely with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which thereupon become registering printing-surfaces for said designs

and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces in their predetermined positions, each in its preestablished seat in the printing-press, in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

69. The improvement in the art of multi-color-printing, which consists in preparing a series of printing-forms, each having a planographic surface suitable to have imposed upon it, and to print, a design, said printing-forms being made of a predetermined size and shape to adapt them to accurately fit in preestablished seats in a printing-press and to fit and work accurately with the cooperating parts of the printing-press; preparing a series of registering basic surfaces bearing removable transfer-sheets having component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn in said transfer-press in an accurate predetermined relation both longitudinally and transversely with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; turning over and thereby imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces in their predetermined positions, each in its preestablished seat in the printing-press, in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; and printing from said printing-surfaces, whereby accurate register in the printing of the designs may be obtained.

70. The improvement in the art of multi-color-printing which consists in preparing a series of tubular printing-forms, each having a planographic surface suitable to have imposed upon it, and to print, a design, and also a series of rotary form-supports therefor, said printing-forms and form-supports being made of a permanent predetermined size and shape to adapt them to accurately fit one upon another, and so that the form-supports are

adapted to accurately fit in preestablished seats in a printing-press, and so that the printing-forms carried on their form-supports are adapted to fit and work accurately with the cooperating parts of the printing-press; preparing a series of registering basic surfaces bearing removable transfer-sheets having component designs and on a rigid base of permanent predetermined size and shape adapted to fit accurately in a preestablished seat in a transfer-press; arranging each of said printing-forms in turn in said transfer-press in an accurate predetermined relation both longitudinally and transversely with respect to its corresponding basic surface seated in said press, and by aid of fixed guiding means, the same for the entire series; turning over and thereby imparting by rolling contact the designs of the basic surfaces to the printing-forms; suitably developing said printing-forms as by etching into printing-surfaces which will thereupon become registering printing-surfaces for said designs and of the character desired, whether planographic, relief or intaglio, and having their designs located thereon in predetermined position for the purpose of register in printing; arranging said printing-surfaces in their predetermined positions, each in its preestablished seat in the printing-press, in predetermined relationship with reference to each other, fixed guiding means being employed whereby this predetermined relationship may be at once attained both longitudinally and transversely and without the usual empiric adjustment; the printing from said printing-surfaces whereby accurate register in the printing of designs may be obtained.

71. The improvement in the art of printing which consists in preparing a basic surface for the design to be printed by applying that design or an impression or impressions thereof to a setting-up plate or other suitable surface according to the position and register desired in the printing; arranging a suitable printing-form adapted to be developed into a primary surface in an accurate predetermined cooperating relation to the said basic surface and by the aid of preestablished guides; imparting by contact with the basic surface the design or an impression or impressions thereof to the said printing-form; developing the said printing-form in suitable manner into a primary surface of the character desired; printing from such primary surface, that is, imparting ink from such surface upon or to one or more suitable secondary printing-forms adapted to be developed into a printing surface or surfaces, the said primary surface and the secondary printing-form being arranged by the aid of preestablished guides in an accurate predetermined relationship the one to the other, whereby the design is carried over from the primary surface and imparted to said secondary printing-form in an accurate and predetermined position with reference to the position and register

ter desired in the ultimate use of the secondary printing-form as a printing-surface; developing the said secondary printing form or forms in suitable manner, into a printing surface or surfaces of the character desired, whereby a plurality of printing-surfaces for the same design may be obtained.

72. The improvement in the art of printing which consists in preparing a basic surface for the design to be printed by applying that design or an impression or impressions thereof to a setting-up plate or other suitable surface according to the position and register desired in the printing; arranging a suitable printing-form adapted to be developed into a primary surface in an accurate predetermined cooperating relation to the said basic surface and by the aid of preestablished guides; imparting by contact with the basic surface the design or an impression or impressions thereof to said printing-form developing said printing-form in suitable manner, into a primary surface of the character desired; printing from such primary surface upon a suitable conveying-surface or successive conveying-surfaces; imparting the design so printed from the said conveying-surface or conveying-surfaces to one or more suitable secondary printing-forms adapted to be developed into a secondary printing surface or surfaces, the said primary surface, a conveying-surface and each secondary printing-form being arranged by the aid of preestablished guides in an accurate and predetermined relationship one to another, whereby through the intermediation of the conveying-surface, the design is carried over from the primary surface and imparted to the secondary printing-form in an accurate and predetermined position thereon with reference to the position and register desired in the ultimate use of the secondary printing-form as a printing-surface, developing the said secondary printing form or forms by etching or in other suitable manner into a printing surface or surfaces of the character desired, whereby a plurality of the printing-surfaces suitable for printing the same design, may be obtained.

73. The improvement in the art of printing which consists in preparing a basic surface for the design to be printed by applying that design or an impression or impressions thereof to a setting-up plate or other suitable surface according to the position and register desired in the printing; arranging a suitable printing-form adapted to be developed into a printing-surface in an accurate predetermined cooperating relation to the said basic surface; communicating to the printing-form the design or an impression or impressions thereof from the basic surface; developing the printing-form by etching or in other suitable manner into a primary printing-surface of the character desired; printing from such primary printing-surface, that is, communicating ink from such surface, upon or to one

or more suitable secondary printing-forms adapted to be developed into a printing-surface, the said primary printing-surface and each secondary printing-form arranged by the aid of preestablished guides in an accurate predetermined relation the one to the other, whereby the design is carried over from the primary printing-surface and imparted to the secondary printing-form in an accurate and predetermined position thereon with reference to the position and register desired in the ultimate use of the secondary printing-form as a printing-surface; developing the said secondary printing form or forms by etching or in other suitable manner into a printing-surface or printing-surfaces of the character desired; suitably inking or otherwise preparing said surface or surfaces for printing; and mounting said secondary printing surface or surfaces in predetermined position in a printing-press and printing therefrom, whereby a plurality of printing-surfaces for the same design may be obtained from one basic surface and the printing of that design and multicolor-printing in accurate register may be indefinitely multiplied or continued beyond the limit of wear of individual printing-surfaces.

74. The improvement in the art of printing which consists in preparing a basic surface for the design to be printed by applying that design or an impression or impressions thereof to a setting-up plate or other suitable surface according to the position and register desired in the printing; arranging a suitable printing-form adapted to be developed into a primary printing-surface in an accurate predetermined cooperating relationship to the said basic surface and by the aid of preestablished guides; communicating to the printing-form the design or an impression or impressions thereof by contact with the basic surface; developing the printing-form by etching or in other suitable manner into a primary printing-surface of the character desired; printing from such primary printing-surface upon a suitable conveying-surface or conveying-surfaces; communicating the design so printed from a conveying-surface or conveying-surfaces to one or more suitable secondary printing-forms adapted to be developed into a secondary printing surface or surfaces, the said primary printing-surface, a conveying-surface, and each secondary printing-form being arranged by the aid of preestablished guides in an accurate predetermined relationship one to another, whereby, through the intermediation of the conveying-surface, the design is carried over from the primary printing-surface and imparted to the secondary printing-form in an accurate and predetermined position thereon with reference to the position and register desired in the ultimate use of the secondary printing-form as a printing-surface; developing said secondary printing form or forms by etching or in other suitable manner into a printing surface

or surfaces of the character desired; and
mounting said secondary printing surface or
surfaces in predetermined position in a print-
ing-press and printing therefrom, whereby a
5 plurality of printing-surfaces for the same de-
sign may be obtained from one basic surface
and the printing of that design and multi-
color-printing in accurate register may be in-
definitely multiplied or continued beyond

the limit of wear of individual printing-sur- 10
faces.

In testimony whereof I have affixed my sig-
nature in presence of two witnesses.

EDWARD HETT.

Witnesses:

FRANK D. BLACKISTONE,
NICHOLAS M. GOODLETT, Jr.