

No. 637,572.

Patented Nov. 21, 1899.

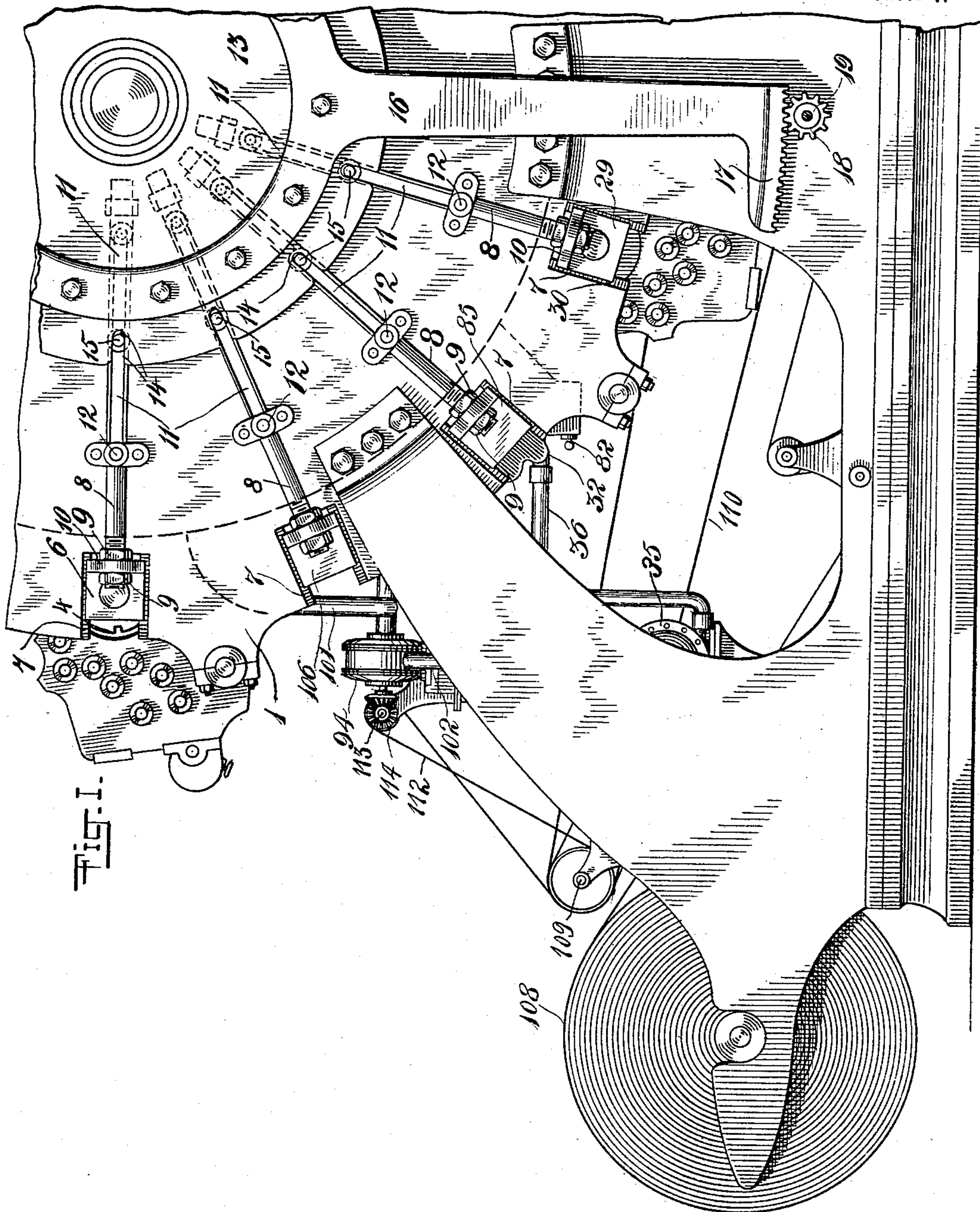
E. HETT.

BRONZING AND DUSTING ATTACHMENT FOR PRINTING PRESSES.

(Application filed Jan. 3, 1899.)

(No Model.)

6 Sheets—Sheet 1.



WITNESSES:

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6 Sheets—Sheet 2.

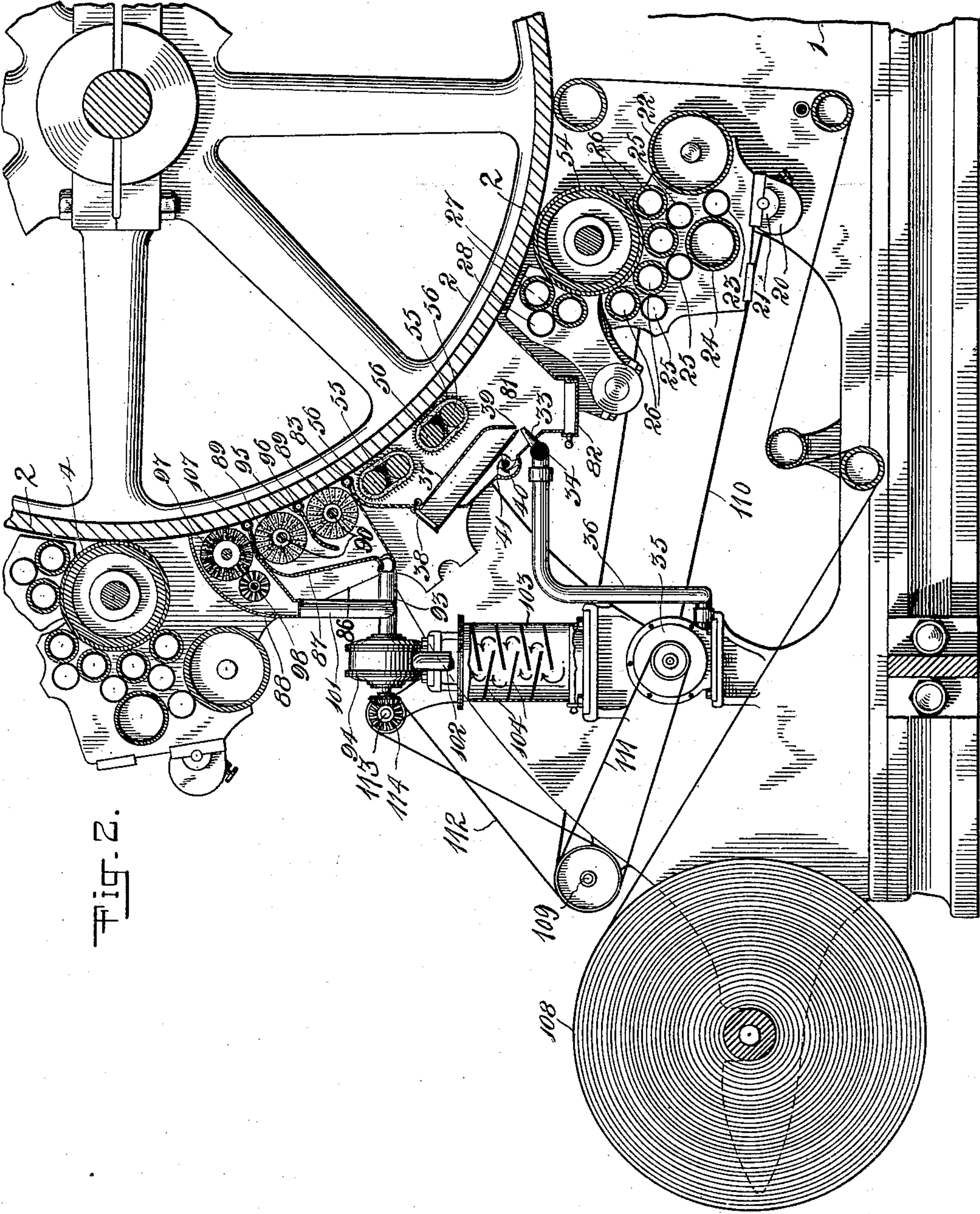


Fig. 2.

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6 Sheets—Sheet 3.

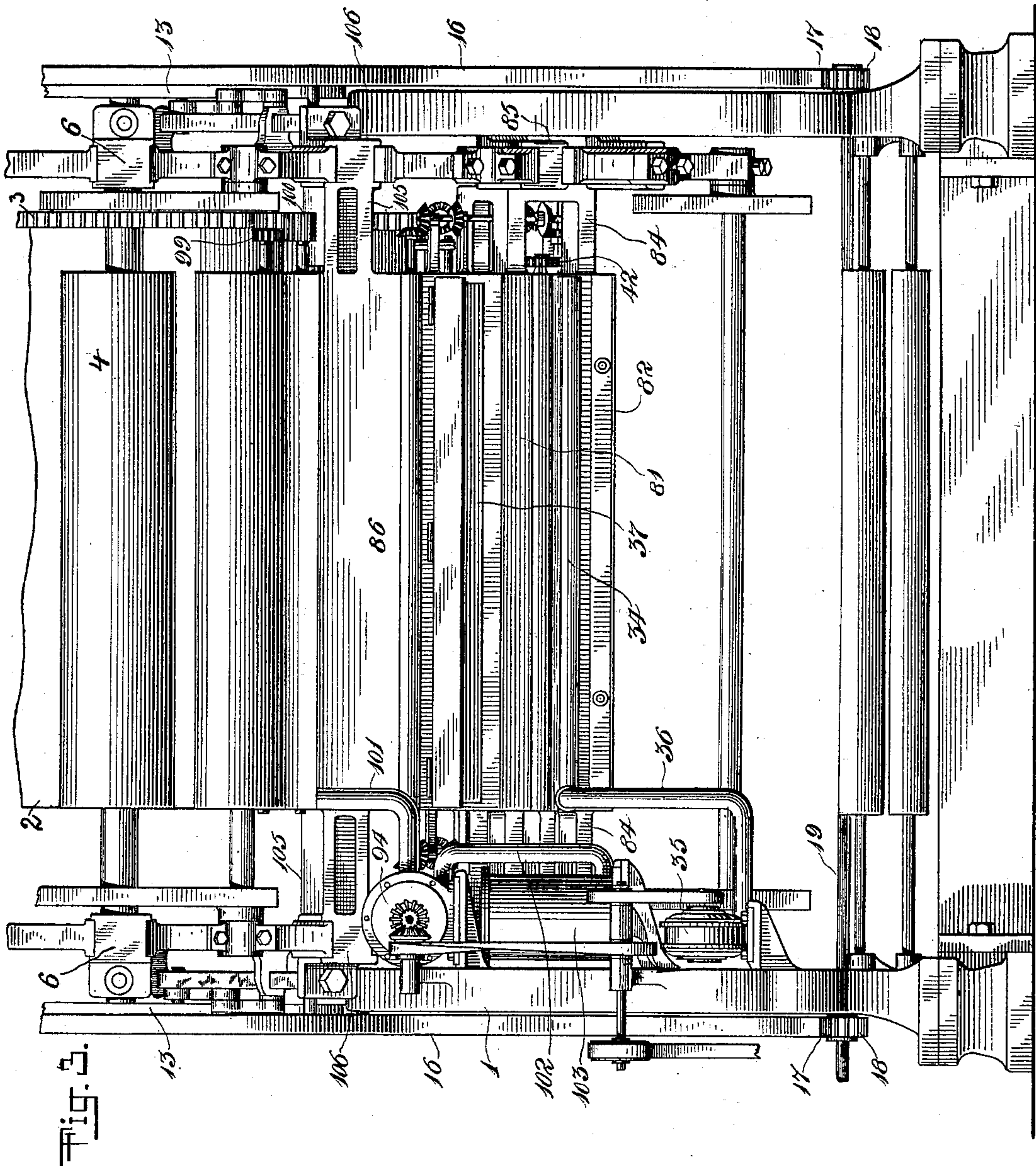


Fig. 3.

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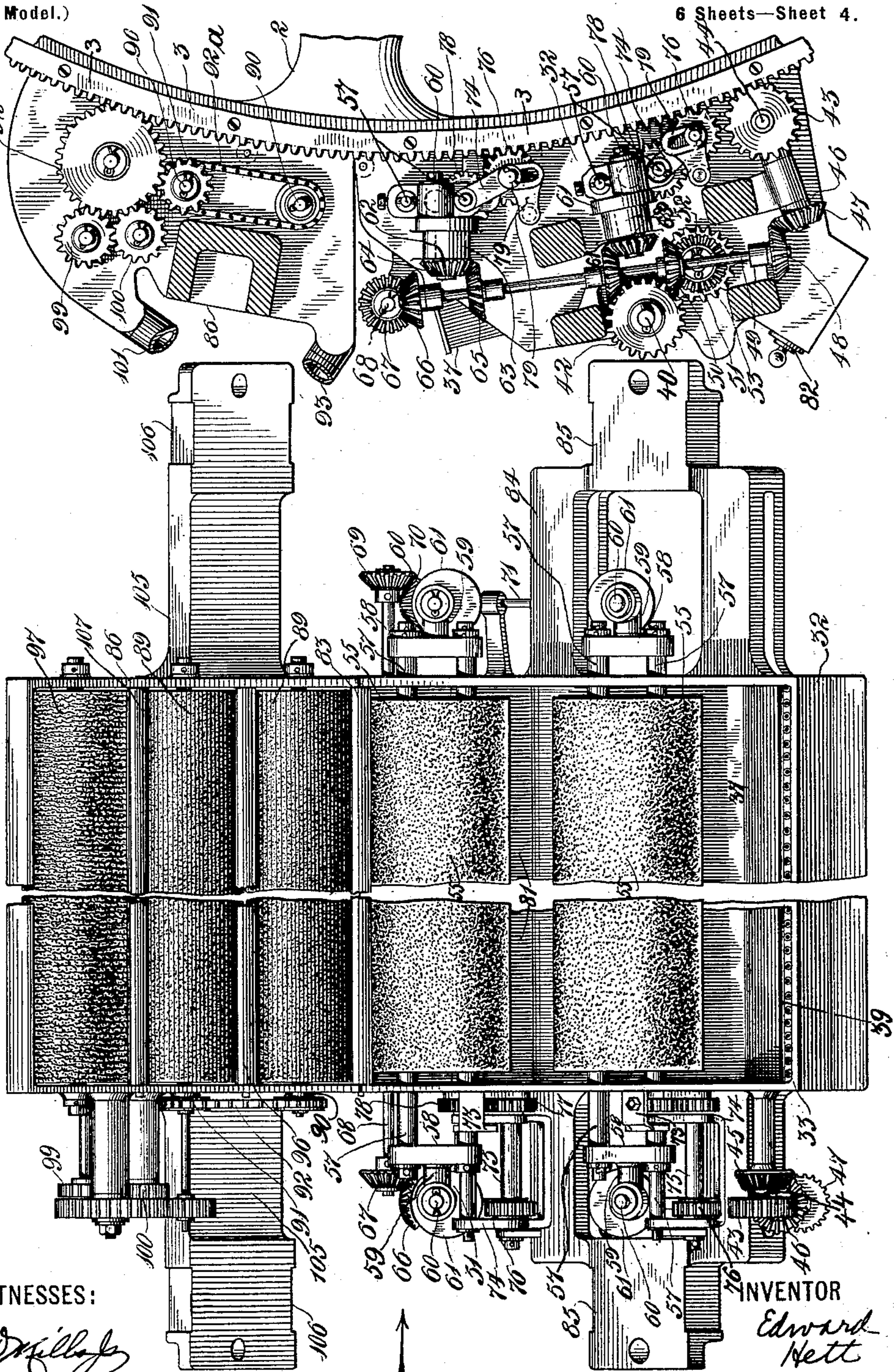
(Application filed Jan. 3, 1899.)

(No Model.)

6 Sheets—Sheet 4.

Fig. 5.

Fig. 4.



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6 Sheets—Sheet 5.

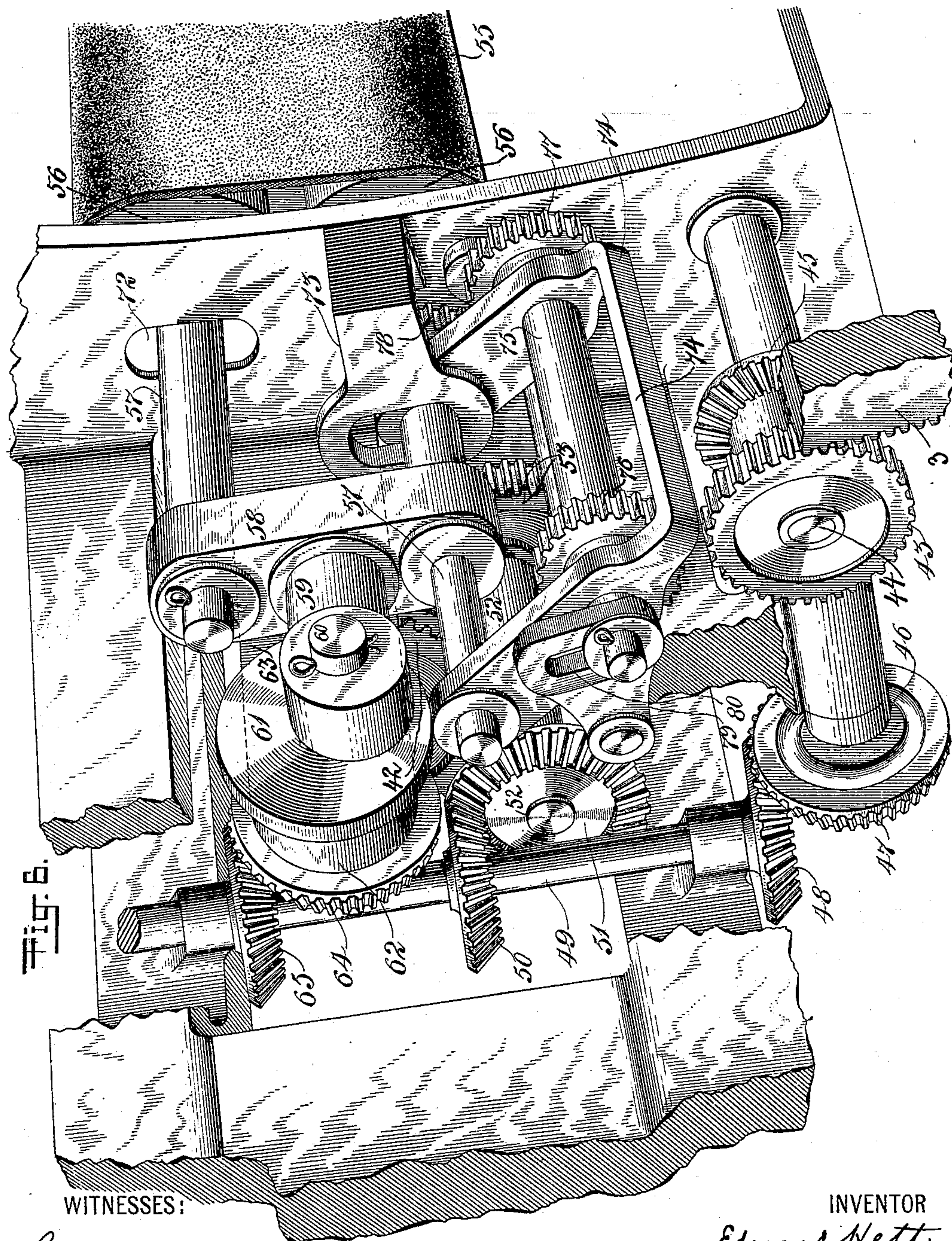


Fig. 6.

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6 Sheets—Sheet 6.

Fig. 6.

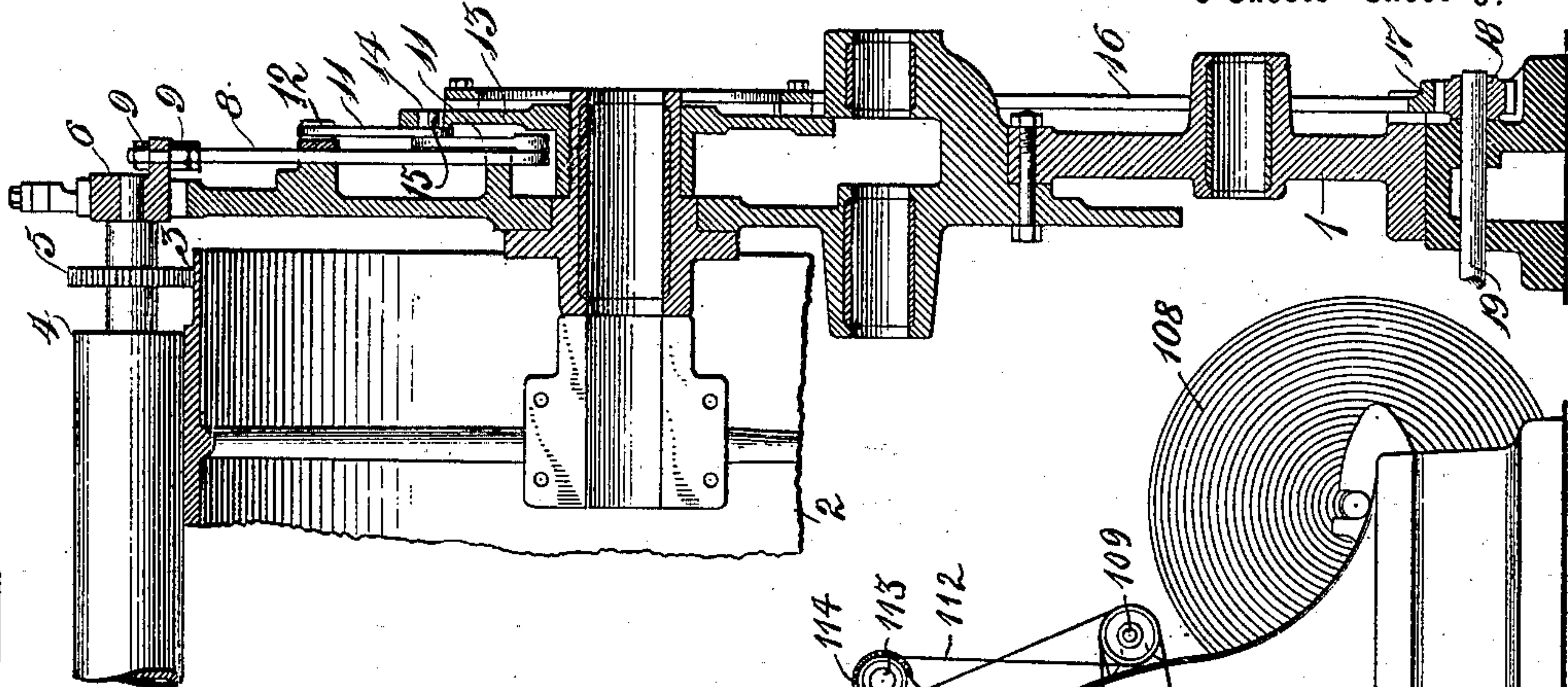
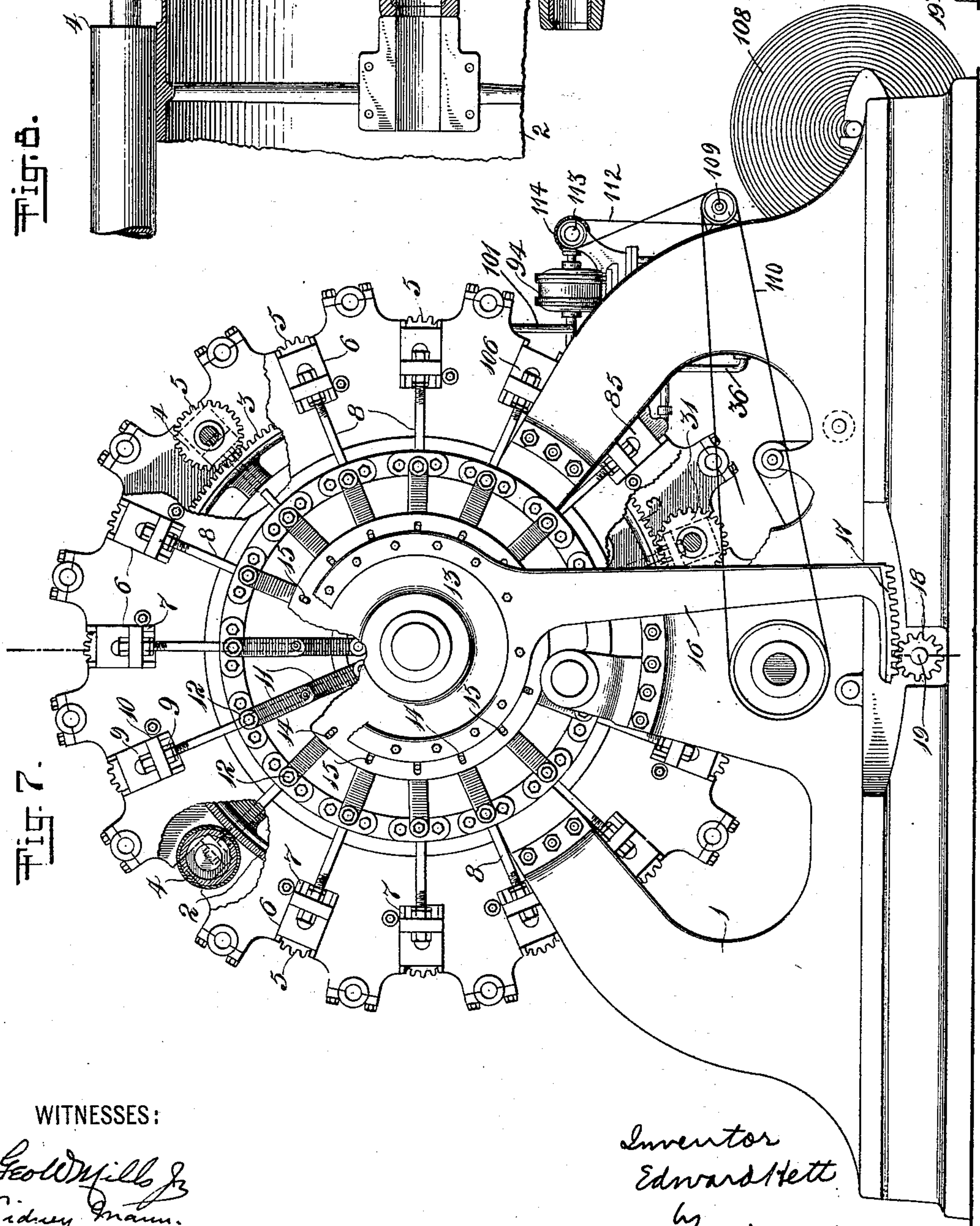


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

BRONZING AND DUSTING ATTACHMENT FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 637,572, dated November 21, 1899.

Application filed January 3, 1899. Serial No. 700,927. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, and a resident of New York, (New Dorp,) in the county of Richmond,
5 State of New York, have invented a new and useful Improvement in Bronzing and Dusting Attachments for Printing-Presses, of which the following is a specification.

My invention consists of an improved
10 bronzing and dusting attachment adapted to be applied to or removed from a printing-press, and in the combination of this attachment with the different parts of the printing-press.

15 One object of my invention is to provide a bronzing and dusting attachment which is adapted to be easily and quickly applied to the press or removed therefrom, so that the press can be used for printing alone, if de-
20 sired, or it can have the bronzing and dusting attachment readily applied to it, so that it can be made to do the printing and the bronzing in one and the same operation.

Another object of the invention is to so
25 construct the bronzing and dusting attachment and to so combine it with the press that accurate register can be secured between the color-printing and the bronze-printing.

Another object of the invention is to pro-
30 vide a bronzing and dusting attachment which is simple in construction and easily manipulated and is economical in use, being adapted to supply a sufficient amount of bronze powder to the paper, but not to waste
35 the powder.

Another object of the invention is to thor-
40 oughly remove all of the surplus powder from those portions of the surface of the paper to which no sizing has been applied and at the same time to prevent the bronze powder from being wasted or lost or from getting into the different parts of the machine, so as to clog the machine or make it dirty.

Another object of the invention is to pro-
45 vide means whereby a large number of copies can be printed upon the web and the web can at the same time be bronzed and dusted in one and the same operation and continuously and rapidly.

50 My invention consists, first, in the combination, in a printing-press with a single im-

pression-drum having a continuous impres-
sion-surface, of one or more rounded and con-
tinuous printing-surfaces or form-cylinders
arranged on or around the impression-face of 55
the drum and a cylinder having a continuous
printing-surface for applying the bronze size
arranged on or around the impression-face of
the drum, the printing-surfaces and the siz-
ing-cylinder being so connected with the drum 60
as to be positively driven therewith during
the printing and bronzing operation, and
mechanism for moving the printing-surfaces
and the sizing-cylinder simultaneously into
and out of contact or coöperation with the im- 65
pression-face of the drum, and a bronzing and
dusting attachment or attachments adapted
to be attached to or removed from the press,
so as to be brought into or out of operative
relation with the impression-drum and adapt- 70
ed to apply the bronze to and distribute it
upon the paper and to remove the superflu-
ous powder therefrom while the paper is car-
ried upon the single impression-drum, where-
by the printing-surfaces and the sizing-cyl- 75
inder are driven at the same rate of speed
with the drum and with one another and it
is possible to secure accurate register between
the color-printing and the bronzing and
whereby the operation of bronzing and print- 80
ing is continuous and automatic. In the best
form of my invention I use a series of radial
arms for moving the printing-surfaces and
sizing-cylinder into and out of contact with
the drum, and I operate these radial arms 85
by self-locking devices, so as to securely hold
the printing-surfaces and the sizing-cylinder
in one position or the other.

My invention also consists in employing the
same mechanism for moving the bronzing and 90
dusting attachment into and out of contact or
coöperation with the impression-drum as is
employed in operating the printing-surfaces
and the sizing-cylinder, whereby the bronz-
ing and dusting attachments, after being once 95
connected with the printing-press, are moved
into and out of contact with the drum and
the paper simultaneously with the printing-
surfaces and the sizing-cylinder. In the best
form of my invention I provide gear connec- 100
tions between the bronzing and dusting at-
tachment or attachments and the impression-

drum, whereby the speed of the bronzing and dusting devices is regulated in accordance with the speed of the drum itself.

In the best form of my invention I make the series of printing-cylinders and the sizing-cylinder of the same predetermined size and arrange them around the impression-face of the drum in a predetermined cooperative relation, and then drive them all positively from the drum itself, whereby accurate and certain register is secured between the different colors and the bronzing, the same being accomplished in a single operation.

My invention also consists in the combination, in a printing and bronzing machine with a suitable impression member or drum and suitable bronzing devices, of one or more printing surfaces or cylinders, a size-applying surface or cylinder, and mechanism for simultaneously bringing said surfaces and the impression member into and out of cooperation.

My invention also consists in the combination, in a bronzing-machine with a suitable impression member or drum, of a suitable size-applying surface or cylinder, a suitable bronze-applying device, and means for simultaneously bringing the size-applying surface and the bronze-applying device and the impression member into and out of cooperation.

My invention also consists in combining in a similar manner with a suitable impression member a bronzing device and a dusting device, or a sizing device, a bronzing device, and a dusting device, or one or more printing devices, a sizing device, a bronzing device, and a dusting device.

My invention also consists in combining with some or all of said devices mechanism for separating them from the impression member and bringing them into cooperation always in the same predetermined position. In connection with this part of my invention I apply the designs to the printing-cylinders and the sizing-cylinder in predetermined correlated positions by any suitable means or method, such as I have described in my previous applications hereinafter referred to.

My invention also consists, in combination with the other necessary features, of a separate bronzing attachment and a separate dusting attachment, each being adapted to be readily applied to or removed from the press, whereby each one of these parts can be separately handled and applied and more accurately adjusted with reference to the impression-drum.

My invention also consists in the particular construction of the bronzing and dusting devices and in other features and combinations hereinafter described and claimed.

My invention is fully illustrated in the accompanying drawings, in which—

Figure 1 is a side view of a part of the press, showing the bronzing and dusting devices applied thereto; and Fig. 2 is a cross-section of the same. Fig. 3 is a rear end view of the printing-press, showing the bronzing and dust-

ing devices applied thereto, being an end view looking from left to right in Fig. 2, the web or roll of paper being omitted. Fig. 4 is a view of the bronzing and dusting appliances looking against the faces which are turned next to the impression-drum, being the view as seen from right to left in Fig. 2 with the drum removed. Fig. 5 is a side view of Fig. 4 looking in the direction of the arrow shown in Fig. 4. Fig. 6 is a perspective detail view of the driving and rocking mechanism of the distributing or rubbing-in belts. Fig. 7 is a side view of the machine, showing the other side from that shown in Fig. 1 and illustrating the manner in which the sizing-cylinder and bronzing and dusting devices are arranged and combined with the printing-surfaces or form-cylinders. Fig. 8 is a partial cross-section of the press shown in Fig. 7 through the axis of the drum, showing the construction of the mechanism for moving the form-cylinders, sizing-cylinder, and bronzing and dusting attachment into or out of contact with the impression-drum.

Similar numbers indicate similar parts in the different figures.

Referring to the drawings, 1 is the frame of the machine.

2 is the impression-drum, suitably mounted in the frame of the machine and provided with any suitable means for driving it. The drum is provided with any suitable kind of surface adapted to be printed upon either lithographically or typographically.

3 3 are gears attached to the ends of the impression-drum.

4 4 are the printing-cylinders, having continuous printing-surfaces and arranged around the impression-face of the drum, as shown in the drawings. These cylinders can be constructed in any suitable manner. I prefer to make them in two parts, consisting of a support and a removable tube, as described in my previous application, Serial No. 537,582. These printing-cylinders are provided with gears 5 5 at their ends, adapted to mesh with gears 3 3 on the impression-drum when the printing-cylinders are brought into contact with the face of the drum. These cylinders are adapted to turn in bearings in the boxes 6 6. The frame of the machine is provided with ways 7, in which the boxes are adapted to slide.

8 8 are radial pressure-arms which are connected at their outer ends with the boxes 6 in such manner that the position of the boxes upon the radial arms can be adjusted. The outer end of each radial arm is provided with a screw-thread, and suitable nuts 9 9 are adapted to turn upon this thread and to clamp between them the projecting portion 10 of the box. By adjusting these nuts on the radial arms 8 8 the box of the form-cylinder can be moved nearer to or farther away from the center of the drum. The arms 8 8 pass through slots in the frame of the machine and are thereby guided in their motion.

11 11 are toggle-levers pivoted together as shown. The outer end of the outer toggle-lever is pivoted to the frame of the machine at 12. (See Figs. 1 and 7.) The inner end

5 of the inner lever is pivoted to radial arm 8.

13 is a shifting plate which is mounted upon the shaft of the impression-drum, so as to turn freely thereon. This plate is provided with slots 14, through which project the pins

10 15, by means of which the toggle-levers are pivoted together.

16 is an arm which is bolted or otherwise suitably fastened to the shifting plate 13 and which is provided at its lower end with a seg-

15 mental gear 17.

18 is a spur-wheel mounted upon the shaft 19, which crosses from one side of the machine to the other.

The radial arms and the operating devices

20 just described are duplicated on both sides of the machines, spur-wheels 18 being mounted upon opposite ends of the shaft 19.

When the shifting plate 13 is in the position shown in Fig. 7, the form-cylinders are

25 held in operative contact with the impression-face of the drum. If the shaft 19 is revolved by any suitable means so as to move the arm

30 17 toward the left, as shown in this figure, the shifting plate 13 will be revolved, the toggle-levers will be drawn together or shortened,

and the form-cylinders will be moved out of contact with the impression-drum.

The parts which have been described thus far are not when separately considered a part

35 of the present invention.

The printing-cylinders are provided with any suitable form of inking and dampening rollers and devices—such, for example, as are shown and described in my previous applica-

40 tion just referred to.

54 is the sizing-cylinder—that is to say, the cylinder by means of which the bronze color or size is applied to the paper. This bronze

45 size is the well-known bronze color which is commonly used in bronzing-machines and which is adapted to make the bronze powder adhere or stick to the paper.

20 is a suitable fountain which is supplied with the bronze size. Any suitable means

50 may be employed for supplying the size to the sizing-cylinder 54. The particular means employed to accomplish this result forms no part of the present invention. In the draw-

55 ings I have represented diagrammatically a series of rollers for accomplishing this purpose.

21 is a roller mounted so as to revolve in the mouth or outlet of the fountain. 22 is

a main distributing-roller. 23 is a bronze

60 roller or rider. 24 is an intermediate distributing-roller. 25 25 are bronze rollers or riders, and 26 26 are the form-sizing rollers.

Any suitable means or device may be used for conveying the size from the roller 21 to

the main distributing-roller 22—as, for ex-

65 ample, a sliding ductor-roller. The size is carried from the roller 21 to the main dis-

tributing-roller 22, and from that to the rider

23, from that to the roller 24, from that to the middle rider 25, from that to the two middle

form-sizing rollers 26, from these rollers to

70 the outer riders 25, and from those to the outer form-sizing rollers 26. The rollers 26

bear against the sizing-cylinder and supply

the same with the bronze size. The surface

of the sizing-cylinder has been previously

75 prepared by having the design which is to appear upon the paper in bronze transferred

to its surface.

27 27 are dampening-rollers, and 28 is a

bronze-roller adapted to supply the dampen-

80 ing-rollers with water. Any suitable form of dampening-rollers can be used, the particular

construction of these rollers forming no part

of the present invention. The roller 28 can

be supplied with water from a fountain by

85 any suitable means, or it could be made in the form of a hollow perforated roller, into which

water was fed in any suitable way. These siz-

ing and dampening rollers may be constructed

in the same way as the inking and dampen-

90 ing rollers described in my previous applications, Serial Nos. 518,015 and 593,796, which

were used in those cases in connection with

the printing or form cylinders. The sizing

fountain and rollers are so arranged that they

95 can be tilted away from the printing-surface, so as to permit the sizing-cylinder to be moved

out of contact with the impression-drum. Similarly the dampening-rollers are adapted

to be moved out of contact with the sizing-

100 cylinder.

The sizing-cylinder is mounted so as to re-

volve in bearings in the boxes 29. These

boxes are constructed similarly to the boxes 6

and are adapted to slide in ways 30 in the

105 frame of the machine. The boxes are also attached at the outer ends to two of the radial

pressure-arms 8, which are constructed and

operated in the manner already described.

The boxes 29 are adjustable upon the radial

110 arms 8 in the same way as the boxes 6. The sizing-cylinder is also provided at its ends

with the gears 31, which are adapted to mesh

with the gears 3 3 on the impression-drum, so

that when the sizing-cylinder is in contact

115 with the impression-drum it is positively driven therewith.

In practical use for multicolor-printing pur-

poses the press herein described and shown

presupposes such a preliminary preparation

120 of the series of printing-surfaces and of the sizing-cylinder before they come to the press,

both with respect to the artist's work and with

respect to the transferrer's work, as is set out,

for instance, in my pending method applica-

125 tion heretofore referred to, Serial No. 695,281, filed November 2, 1898, and especially such

transferring to the printing-surfaces and the

sizing-cylinder in accurate and related regis-

ter throughout the whole series, as is set out,

130 for instance, in my pending application for transfer-presses, Serial No. 531,918, filed De-

cember 15, 1894, renewed May 22, 1899, Serial

No. 718,570, and Serial No. 568,795, filed No-

vember 13, 1895. Assuming such preparation of the series of printing-surfaces and the sizing-cylinder, the permanent adjustment or adaptation of the printing-press to such a related system of transferring is attained in the following manner: Parts of the printing-press are constructed in size and proportion to effect exact registry when the printing-surfaces and the sizing-cylinder receive accurate and related register, as referred to above, and are introduced into the printing-press in proper meshing relationship to its parts. This proper meshing relationship must be experimentally determined when the press is for the first time used; but having been so determined it may be conveniently and permanently retained by marking at any given position of the press as a whole the several gear-wheels 5 5 and 31 and the gear-wheels 3 3 on the impression-drum where they come together the tooth of the one that at such time takes into a recess of the other marked tooth in marked recess. Thus whenever a printing-cylinder or the sizing-cylinder is removed and the same or another one is inserted again it is only necessary to see to it that the gears 5 5 or 31 and the gears 3 3 so mesh that the marked tooth of the one will take into the marked recess of the other. As a result of this construction after the designs have been properly transferred to the printing-cylinders and the sizing-cylinder and they have been properly inserted in and connected with the press the designs upon the printing-cylinders and the designs upon the sizing-cylinder will exactly register and will continue to do so throughout the operation of the press.

32 is a bronzing attachment adapted to be applied to the impression-face of the drum and to apply the bronze to and distribute it upon the paper.

33 is a series of nozzles extending across the machine, so as to be at least as wide as the paper carried upon the drum. They are supported by a pipe 34, running across the machine, and this pipe 34 is connected with a blower 35 by means of the connecting-pipe 36. Any suitable form of blower may be used for this purpose. The blower forces air through the connecting-pipes and directs jets of air against the paper or material to be printed upon.

37 is a reservoir to hold the supply of bronze or other powder. This reservoir is pivoted at its upper end at 38 and is provided at its lower end with an outlet-opening 39 to convey the powder to the jets. This outlet-opening consists merely of a slit running entirely across the reservoir at its lower end, forming an outlet for the escape of the powder. The reservoir is so placed that this discharge-opening for the powder is immediately above the nozzles 33.

40 is a shaft carrying one or more joggers 41. These joggers are simply notched wheels suitably fastened to the shaft. The weight of the reservoir tends to press the same against

these wheels, and the projections on the wheels act as cams and cause the box to be vibrated or shaken as the shaft 40 is revolved. This tends to shake the bronze powder out through the opening 39 and to feed it constantly to the jets of air. The shaft 40 is provided at its end with a gear 42. (See Fig. 5.) This gear 42 is driven from the gear 3 on the impression-drum by means of intermediate gearing, as follows:

43 (see Fig. 5) is the gear-wheel, meshing with the gear 3 on the impression-drum and mounted on the shaft 44. At the inner end of the shaft 44 is a beveled gear 45, (see Fig. 6,) which meshes with a beveled gear on the inner end of the shaft 46. At the outer end of the shaft 46 is a miter-gear 47, meshing with the miter-gear 48 on the upright shaft 49. 50 is a miter-gear on the shaft 49, meshing with the miter-gear 51 on the horizontal shaft 52. At the inner end of the shaft 52 is the gear-wheel 53, which meshes with the gear 42 on the jogging-shaft 41.

55 55 are distributing or rubbing-in belts. They are provided with a surface of fur or similar material. In the form of machine shown two of these belts are employed, although the number can of course be varied according to circumstances. These belts are similarly mounted and operated. Each belt is mounted upon two rollers 56 56, which are adapted to revolve and with which the belt moves. These rollers can be made to revolve in either direction, so that the distributing-belt will be made to move in the same direction with the paper or in the opposite direction. The rollers, and therefore the belts, are given an oscillating crank movement over the surface of the paper or material to be bronzed, as follows:

57 57 are the shafts of the rollers, carrying the distributing-belts. These shafts project through suitable openings or slots in the side walls of the compartment inclosing the bronzing apparatus. (See Figs. 4, 5, and 6.) These projecting ends revolve in bearings in the cross-head 58. The cross-head 58 is supported by the connecting-rod 59, upon which the cross-head is pivoted, so as to turn on said rod. The connecting-rod 59 is pivoted upon the crank-pin 60, which is carried by the disk 61, which is mounted on shaft 62, so as to turn with said shaft. The shaft 62 revolves in a bearing in an ear or lug 63, which projects from the side wall of the bronzing attachment. At the outer end of the shaft 62 is a beveled gear 64, meshing with a beveled gear 65 on the upright shaft 49.

Each pair of rollers 56 has a cross-head 58 at both ends constructed and operated in the manner already described and having connecting and driving parts similar to those already described, with the single exception that the shafts 62 on the right side of the machine, as shown in Fig. 4, are also driven from the shaft 49 by the following mechanism.

66 is a miter-gear at the upper end of the

shut off from each other. The compartment 87 is provided with two dusting-rollers 89. These rollers can be made in any suitable way. For example, they can be made from 5 pieces or strips of material that are folded and at their folded ends fastened to the surface of a small roller, the free end serving to dust the paper. These rollers are made to revolve rapidly in a direction opposite to that 10 of the paper by the following means: The shafts 90 of the dusting-rollers revolve in bearings in the side walls of the dusting attachment. (See Figs. 4 and 5.) The upper shaft 90 is provided at its end with a gear-wheel 91, which meshes with the idler-gear 92, which meshes with the gear 3 on the im- 15 pression-drum. Both the shafts 90 are provided with sprocket-wheels, and the two shafts are connected by the chain 92^a, which runs over these sprocket-wheels, so that the two shafts revolve together. The compart- 20 ment 87 is connected, by means of a pipe 93, with an exhausting apparatus 94. Any suitable form of suction-fan may be employed for this purpose. As the dust is removed 25 from the surface of the paper by the dusting-rollers 89 it is drawn out from the compartment by means of the exhauster, so that it cannot be again deposited upon the surface 30 of the paper. The compartment 87 is partially divided by a partition 95, extending across the compartment and separating the dusting-rollers from each other. This prevents the dust from being thrown from one 35 roller upon the other.

96 is a small roller made of rubber or other suitable material and adapted to revolve with the paper, being supported at its ends in bearings, in which it turns freely. This roller pre- 40 vents the passage of dust from one part of the compartment 87 to the other part of the compartment.

The compartment 88 contains a roller 97, provided with a surface of felt or some simi- 45 lar substance adapted to pick up or remove from the paper all the loose particles of bronze not permanently applied to the paper over the size and not previously removed by the dusting-rollers. This roller is mounted 50 in bearings in the side walls of the compartment 88 and is adapted to turn freely therein, so that when it is brought to bear upon the impression-drum it will revolve with the drum and the paper.

98 is a rotary brush made in any suitable way and turning in bearings in the side walls of the compartment and adapted to bear 55 against the surface of the felt roller 97. The brush is made to revolve in the same direction as the felt roller 97, so that at the line of contact between the brush and the roller the surface of the brush will be moving in an op- 60 posite direction from the surface of the roller and will therefore scrape off from the surface of the roller all of the bronze which the roller has picked up from the paper. The rotary brush is preferably revolved at a higher rate

of speed than the roller. The shaft of the rotary brush has at its outer end a gear-wheel 99, which meshes with an elongated 70 gear 100, which meshes with the idler-gear 92, which is driven from the gear on the impression-drum. The compartment 88 is connected with the exhausting apparatus 94 by means of the pipe 101, so that the dust which 75 is picked up from the paper by the rubber roller is drawn out from the compartment and discharged through the exhauster. The discharge-pipe 102 of the exhauster is connected with the bottom of a separator 103, 80 which is provided with overlapping shelves 104. In this separator the dust is separated from the air and deposited upon the shelves and the air is discharged from the machine substantially free from dust. In this way 85 loss or waste of the powder is prevented. The powder can be taken from the separator and put into the reservoir 37 and used again.

The dusting attachment is provided at its ends with the projecting arms 105, which 90 carry the sliding plates 106. These plates are adapted to slide back and forth in the ways 7 in the frame of the machine. They are attached to the outer ends of the radial pressure-arms 8 in the same manner as the 95 boxes of the sizing-cylinder and the printing-cylinder. Their position on the radial arms can be adjusted by means of locking-nuts, as already fully explained. The radial arms to which the dusting device is at- 100 tached are constructed and operated in the manner heretofore set forth. 107 is a small roller, made of rubber or other suitable material, mounted in the walls of the dusting attachment, so as to turn freely with the im- 105 pression-drum when it is brought into contact therewith. It serves to prevent the escape of any of the dust or powder from one compartment of the dusting attachment to the other. 110

It will be seen that the dusting device can be readily removed from or attached to the press, and its position on the radial arms can be accurately regulated. When the other 115 parts of the machine are moved out of contact with the impression-drum, it is also moved out of contact, and when they are moved into contact with the impression-drum it is likewise moved into contact.

108 represents the roll of paper or other ma- 120 terial which is being printed upon in the machine.

The blower and the exhausting device can be driven by any suitable means. I prefer to connect them with the main driving-shaft of 125 the press.

In the constructions shown in the drawings 109 is an intermediate shaft provided with three pulleys. 110 is a belt running from one of these pulleys to a pulley on the main shaft. 130 111 is a belt running from another of these pulleys to a pulley on the shaft of the blower. 112 is a belt running from the third pulley on the shaft 109 to a pulley on the shaft 113, which

shaft 49, meshing with the miter 67 on the horizontal shaft 68, which runs across the machine and carries on its other end the miter-gear 69, which meshes with the miter-gear 70 on the shaft 71, which is mounted in suitable brackets supported from the walls of the bronzing-compartment. The shaft 71 drives the shafts 62 on its side of the machine by means of miter-gears mounted, respectively, on the said shafts. As a result of this construction the four shafts 62, which carry the disks, are all driven at the same rate of speed. The openings in the walls of the bronzing-compartment, through which the shafts 57 pass, are made in the form of curved guiding-slots 72. These slots are curved concentrically with the axis of the drum. As the rollers are given their oscillating crank movement they are guided by these slots, so that they are always at the same distance from the surface of the impression-cylinder, whereby they are always kept in proper operative relation with the surface of the paper and are enabled to distribute the bronze thoroughly and over the entire surface.

73 is a bracket extending from the wall of the bronzing-compartment and provided with a similar curved guiding-slot, through which the lower shaft 57 passes and by means of which that shaft is also guided properly.

The rollers are made to revolve by the following means. The lower shaft 57 of each pair of shafts is extended on one side of the machine, as shown in Figs. 4, 5, and 6. Upon this shaft 57 is hung or pivoted the rocking frame 74. This rocking frame carries an intermediate shaft 75, which is adapted to turn in bearings in the frame. This shaft is provided near its outer ends with the gear-wheel 76, which is adapted to mesh with the gear 3 on the impression-drum when the bronzing attachment is in operative position in the press. At the inner end of the shaft 75 is a gear-wheel 77, which is adapted to mesh at all times with the gear-wheel 78, which is keyed or feathered to the shaft 57. 79 is a bracket supported from the wall of the bronzing attachment and provided with a curved guiding-slot 80, through which the outer end of the intermediate shaft 75 projects and by means of which that shaft is guided, so as to be maintained always at the same distance from the impression-drum. As the shafts 57 are oscillated in the manner already described the lower shaft 57 slides backward and forward in its bearings in the arms of the rocking frame 74 and at the same time the rocking frame is raised and lowered as the shaft 57 rises and falls. During this motion the rocking frame rocks on both shafts 57 and 75, but holds those shafts always at the same distance from each other, and thereby causes the gears 77 and 78 to continuously mesh with each other. As the shaft 75 rises and falls it is kept at the same distance from the impression-drum by means of the curved guiding-slot 80 in the bracket 79, and as a result of

this the gear-wheel 76 always meshes with the rack 3 on the impression-drum, while the bronzing attachment is kept in operative position. The distributing-belts are in this way given two distinct motions—first, the motion produced by the revolution of the rollers, and, secondly, the oscillating crank motion, which is, in effect, made up of two directions of motion—to wit, a motion longitudinally of the paper and at the same time a motion crosswise of the paper. As a result of this the distributing-belts distribute and rub in the bronze very thoroughly, so that a perfect coating of bronze is applied to those parts of the paper to which the bronze sizing was previously applied.

81 is a closed compartment entirely covering the different parts of the bronzing attachment, except that the upper end of the reservoir 37 projects out of this compartment and is provided with a pivoted cover or lid through which bronze powder can be supplied to the reservoir from time to time. At the lower end of the compartment there is a drawer 82, (see Fig. 2,) adapted to catch the surplus bronze that falls to the bottom of the compartment. By this means the bronze that collects at the bottom of the compartment can be removed from time to time and placed in the reservoir.

83 is a small rubber or felt roller which is mounted at its ends in bearings in the walls of the bronzing device and which is adapted to turn freely in those bearings, so that it will bear against the paper and revolve with the paper, so as not to have any scraping action on the surface of the paper. The object of this roller is to prevent any of the bronze powder from escaping at this point from the bronzing-compartment. The bronzing attachment is provided at both ends with projecting arms 84, (see Fig. 4,) which carry at their outer ends the sliding plates 85. These plates 85 are adapted to slide back and forth in the ways 7 of the frame of the machine, as illustrated in Fig. 1. The sliding plates are connected with the radial pressure-arms 8 in the same manner as the boxes of the sizing-cylinder and the printing-cylinders already fully explained. The radial arms are constructed and operated in the manner already set forth. By adjusting the nuts at the outer end of the radial arms 8 the position of the bronzing attachment with reference to the impression-drum can be accurately regulated. It will be seen that the bronzing attachment can be very easily removed from the press or applied thereto and can be very accurately and easily adjusted, so as to be in proper contact with the impression-drum. When by means of the devices already explained the sizing-cylinder and the printing-surfaces are moved out of contact with the drum, the bronzing devices are also moved away from the drum at the same time.

86 is a dusting attachment. It is provided with two compartments 87 and 88, which are

drives the shaft of the exhauster 94 by means of the intervening gears 114.

As a result of the employment of my invention the paper or other material can be bronzed and printed upon in many colors in a single operation and continuously. The bronzing can be made to register accurately with the color-printing. The bronze is applied in a very thorough and effective manner and is very effectively distributed and rubbed into the surface of the paper. The bronze-powder is confined to the bronzing device and is prevented from escaping and from clogging up the other parts of the machine as well as from coming into contact with the other colors or printing devices. All superfluous powder or dust is thoroughly removed from the surface of the paper and at the same time is prevented from being deposited upon other parts of the machine. The powder or dust which is removed in this way from the paper is separated from the escaping current of air, so that it can be used again.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a printing-press, the combination with a single impression-drum having a continuous impression-surface of one or more rounded printing-surfaces arranged on the impression-face of the drum, and a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the sizing-cylinder being positively driven with the drum, and mechanism for moving the same into and out of contact with the impression-face of the drum, said mechanism including a series of radial arms connected for operation with the printing-surfaces and the sizing-cylinder, and means for operating said arms, and a bronzing and dusting attachment adapted to be attached to and removed from the press so as to be brought into or out of operative relation with the impression-drum, and adapted to apply the bronze to and distribute it upon the paper, and to remove the superfluous powder therefrom, while the paper is carried upon the single impression-drum.

2. In a printing-press, the combination with a single impression-drum having a continuous impression-surface of one or more rounded and continuous printing-surfaces arranged on the impression-face of the drum, and a cylinder having a continuous printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the sizing-cylinder being positively driven with the drum, and self-locking mechanism for moving the same into and out of contact with the impression-face of the drum, said mechanism including a series of radial arms connected for operation with the printing-surfaces and the sizing-cylinder, and means for operating said arms, and a bronzing and dusting attachment adapted to be attached to and removed from the press so as to be brought into or out of operative relation

with the impression-drum, and adapted to apply the bronze to and distribute it upon the paper, and to remove the superfluous powder therefrom, while the paper is carried upon the single impression-drum.

3. In a printing-press, the combination with a single impression-drum having a continuous impression-surface of one or more rounded and continuous printing-surfaces arranged on the impression-face of the drum; and a printing-surface for applying the bronze size arranged on the impression-face of the drum; the printing-surfaces and the sizing-cylinder being positively driven with the drum, and a bronzing and dusting attachment adapted to be applied to the impression-face of the drum, and mechanism for moving the printing-surfaces, the sizing-cylinder and the bronzing and dusting devices into and out of contact with the impression-face of the drum.

4. In a printing-press, the combination with a single impression-drum having a continuous impression-surface of one or more rounded and continuous printing-surfaces arranged on the impression-face of the drum, and a cylinder having a continuous printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the sizing-cylinder being positively driven with the drum, and a bronzing and dusting attachment adapted to be applied to the impression-face of the drum, and mechanism for moving the printing-surfaces, the sizing-cylinder and the bronzing and dusting devices into and out of contact with the impression-face of the drum, said mechanism including pressure-arms operatively connected with the printing-surfaces, the sizing-cylinder and the bronzing and dusting attachment and means for moving the pressure-arms in and out simultaneously.

5. In a printing-press, the combination with a single impression-drum having a continuous impression-surface of one or more rounded printing-surfaces arranged on the impression-face of the drum, and a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the sizing-cylinder being positively driven with the drum, and a bronzing and dusting attachment adapted to be applied to the impression-face of the drum, and mechanism for moving the printing-surfaces, the sizing-cylinder and the bronzing and dusting devices into and out of contact with the impression-face of the drum, said mechanism including pressure-arms operatively connected with the printing-surfaces, the sizing-cylinder and the bronzing and dusting attachment, means for moving the pressure-arms in and out simultaneously, and gear connections on the bronzing and dusting attachment, adapted to be driven by the impression-drum when the attachment is in operative position on the drum and adapted to drive the bronzing and dusting devices, substantially as set forth.

6. In a printing-press, the combination with a single impression-drum having a continuous impression-surface of one or more rounded and continuous printing-surfaces arranged on the impression-face of the drum, and a cylinder having a continuous printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the sizing-cylinder being positively driven with the drum, and a bronzing and dusting attachment adapted to be applied to the impression-face of the drum, and self-locking mechanism for moving the printing-surfaces, the sizing-cylinder and the bronzing and dusting devices into and out of contact with the impression-face of the drum, said mechanism including pressure-arms operatively connected with the printing-surfaces, the sizing-cylinder and the bronzing and dusting attachment, means for moving the pressure-arms in and out simultaneously, and gear connections on the bronzing and dusting attachment, adapted to be driven by the impression-drum when the attachment is in operative position on the drum and adapted to drive the bronzing and dusting devices, substantially as set forth.

7. In a printing-press, the combination of a single impression-drum having a continuous impression-surface, printing-cylinders arranged around the impression-face of the drum, a sizing-cylinder having a continuous printing-surface for applying the bronze size arranged upon the impression-face of the drum, gearing between the said cylinders and the drum whereby they are driven positively with the drum, boxes at the ends of the printing and sizing cylinders having bearings in which said cylinders turn, ways in the frame of the machine in which the boxes move, radial arms connected with said boxes, means for adjusting the position of the boxes on the radial arms, means for operating said radial arms, and a bronzing and dusting attachment adapted to be attached to and removed from the press so as to be brought into or out of operative relation with the impression-drum and adapted to apply the bronze to and distribute it upon the paper, and to remove the superfluous powder therefrom while the paper is carried upon the single impression-drum, substantially as set forth.

8. In a printing-press, the combination of a single impression-drum having a continuous impression-surface, printing-cylinders arranged around the impression-face of the drum, a sizing-cylinder having a printing-surface for applying the bronze size arranged upon the impression-face of the drum, gearing between the said cylinders and the drum whereby they are driven positively with the drum, boxes at the ends of the printing and sizing cylinders having bearings in which said cylinders turn, a bronzing attachment, a dusting attachment, supporting-arms projecting from the ends of the bronzing and dusting attachments, ways in the frame of the ma-

chine in which the boxes and supporting-arms move, radial arms connected with said boxes and supporting-arms, means for adjusting the position of the boxes and supporting-arms on the radial arms, means for operating said radial arms, and gear connections between the bronzing and dusting attachments and the cylinder, substantially as set forth.

9. In a printing-press, the combination of a single impression-drum having a continuous impression-surface, printing-cylinders arranged around the impression-face of the drum, a sizing-cylinder having a continuous printing-surface for applying the bronze size arranged upon the impression-face of the drum, gearing between the said cylinders and the drum whereby they are driven positively with the drum, a separate bronzing attachment adapted to be attached to and removed from the press and to apply the bronze powder to and distribute it upon the paper while the paper is being carried upon the impression-drum, and a separate dusting attachment adapted to be attached to and removed from the press and to remove all the superfluous powder from the surface of the paper while the paper is being carried upon the same impression-drum, substantially as set forth.

10. In the bronzing device of a press, the combination of means for applying the powder to the material, and one or more distributing-belts having a surface of fur or other suitable material, rollers upon which each belt is carried and with which it revolves, and means for giving the rollers and the belts an oscillating crank movement over the surface of the material to be bronzed, substantially as set forth.

11. In the bronzing device of a press, the combination of means for applying the powder to the material, and one or more distributing-belts having a surface of fur or other suitable material, rollers upon which each belt is carried and with which it revolves, and a cross-head at the end of the rollers having bearings in which the rollers revolve, an operating-shaft, a crank-arm on said shaft, and means for connecting the crank-arm with the cross-head, and means for driving the shaft, substantially as set forth.

12. In a press, the combination of a revolving impression-drum, a device for applying bronze color or size, means for applying the powder to the material, one or more distributing-belts having a suitable surface, rollers upon which each belt is carried and with which it revolves, the cross-heads having bearings in which the rollers revolve, the shafts provided with the disks, and crank-pins, the connecting-rods on which the cross-heads are pivoted, and curved guiding-slots in the frame to guide the rollers and keep them always at the same distance from the surface of the impression-cylinder, and means for driving the shafts at the same speed, substantially as set forth.

13. In a press, a bronzing or similar device consisting of the combination of one or more nozzles adapted to direct one or more jets of air against the material to be printed upon, a blower to force air through the nozzle or nozzles, a reservoir to hold the bronze or other powder, an outlet opening or pipe to convey the powder to the jet or jets, and one or more distributing-belts having a surface of fur or other suitable material, rollers upon which each belt is carried and with which it revolves, and means for giving the rollers and the belts an oscillating crank movement over the surface of the material to be bronzed, substantially as set forth.

14. In a press, a bronzing or similar device consisting of the combination of one or more nozzles adapted to direct one or more jets of air against the material to be printed upon, a blower to force air through the nozzle or nozzles, a reservoir to hold the bronze or other powder, an outlet opening or pipe to convey the powder to the jet or jets, and one or more distributing-belts having a surface of fur or other suitable material, rollers upon which each belt is carried and with which it revolves, and a cross-head at the end of the rollers having bearings in which the rollers revolve, an operating-shaft, a crank-arm on said shaft, and means for connecting the crank-arm with the cross-head, and means for driving the shaft, substantially as set forth.

15. In a press, a bronzing or similar device consisting of the combination of one or more nozzles adapted to direct one or more jets of air against the material to be printed upon, a blower to force air through the nozzle or nozzles, a reservoir to hold the bronze or other powder, an outlet opening or pipe to convey the powder to the jet or jets, and one or more distributing-belts having a surface of suitable material, rollers upon which each belt is carried and with which it revolves, and a compartment, inclosing the nozzle or nozzles, and the distributing-belts, and rollers, adapted to confine the powder within the bronzing device, substantially as set forth.

16. In a press, a bronzing or similar device consisting of the combination of one or more nozzles adapted to direct one or more jets of air against the material to be printed upon, a blower to force air through the nozzle or nozzles, a reservoir to hold the bronze or other powder, an outlet opening or pipe to convey the powder to the jet or jets, and one or more distributing-belts having a surface of suitable material, rollers upon which each belt is carried and with which it revolves, and a compartment, inclosing the nozzle or nozzles, the distributing-belts and rollers, adapted to confine the powder within the bronzing device, and a roller at the end of the compartment where the paper passes out of the bronzing device adapted to bear against the impression-cylinder and to revolve with it so as to prevent the escape of powder at that point, substantially as set forth.

17. In a press, a bronzing or similar device consisting of the combination of one or more nozzles adapted to direct one or more jets of air against the material to be printed upon, a blower to force air through the nozzle or nozzles, a reservoir to hold the bronze or other powder, an outlet opening or pipe to convey the powder to the jet or jets, and one or more distributing-belts having a surface of suitable material, rollers upon which each belt is carried and with which it revolves, and a compartment, inclosing the nozzle or nozzles, the distributing-belts and rollers, adapted to confine the powder within the bronzing device, and a drawer in the bottom of the compartment to catch the powder that falls to the bottom, substantially as set forth.

18. In a press, the combination with an impression-drum and a suitable device for applying the bronze, of a dusting device consisting of a closed compartment, one or more dusting-rollers adapted to revolve in said compartment and to bear against the impression-drum, an exhauster connected with said compartment, and a separator into which the exhauster discharges for collecting the bronze powder, said separator being provided with overlapping shelves, substantially as set forth.

19. In a press, the combination with an impression-drum and a suitable device for applying the bronze, of a dusting device consisting of a closed compartment, one or more dusting-rollers adapted to revolve in said compartment and to bear against the impression-drum, an exhauster connected with said compartment, and rollers at the ends of the compartment where the paper passes into and out of the dusting device adapted to bear against the impression-cylinder and to revolve with it so as to prevent the escape of powder at that point, substantially as set forth.

20. In a press, the combination with an impression-drum, and a suitable device for applying the bronze, of a dusting device consisting of a closed compartment, a roller provided with a surface of felt or similar material adapted to bear against the impression-drum and to revolve with it, and an exhauster connected with said compartment, substantially as set forth.

21. In a press, the combination with an impression-drum, and a suitable device for applying the bronze, of a dusting device consisting of a closed compartment, a roller provided with a surface of felt or similar material adapted to bear against the impression-drum and to revolve with it, and a rotary brush adapted to bear against the felt roller and to revolve in the same direction with it, and an exhauster connected with said compartment, substantially as set forth.

22. In a press, the combination with an impression-drum, and a suitable device for applying the bronze, of a dusting device consisting of a closed compartment, a roller provided with a surface of felt or similar ma-

material adapted to bear against the impression-drum and to revolve with it, and a rotary brush adapted to bear against the felt roller and to revolve in the same direction with it, an exhauster connected with said compartment, and one or more rollers at the end or ends of the compartment adapted to bear against the impression-cylinder and to revolve with it so as to prevent the escape of powder at that point, substantially as set forth.

23. In a press, the combination with an impression-drum and a suitable device for applying the bronze, of a dusting device consisting of two closed compartments, one compartment being provided with one or more dusting-rollers adapted to revolve in said compartment and to bear against the impression-drum, and the other compartment being provided with a roller having a surface of felt or similar material adapted to bear against the impression-drum, an exhausting device, and pipes leading from the compartments to the exhausting device, substantially as set forth.

24. In a printing and bronzing machine, the combination with an impression member, of one or more printing-surfaces, a size-applying surface, mechanism for simultaneously bringing said surfaces and the impression member into and out of coöperation, and bronzing devices.

25. In a printing and bronzing machine, the combination with a single impression-drum having a continuous impression-surface, of one or more rounded printing-surfaces arranged on the impression-face of the drum, and a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, mechanism for simultaneously bringing said surfaces and the impression-drum into and out of coöperation, and bronzing devices.

26. In a printing and bronzing machine, the combination with a single impression-drum having a continuous impression-surface, of one or more rounded printing-surfaces arranged on the impression-face of the drum, and a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the bronzing-cylinder being positively driven with the drum, mechanism for simultaneously bringing said surfaces and the impression-drum into and out of coöperation, and bronzing devices.

27. In a printing and bronzing machine, the combination with an impression member, of one or more printing-surfaces, a size-applying surface, self-locking mechanism for simultaneously bringing said surfaces and the impression member into and out of coöperation, and bronzing devices.

28. In a bronzing-machine, the combination with an impression member, of a size-applying surface, a bronze-applying device and means for simultaneously bringing the

size-applying surface and the bronze-applying device and the impression member into and out of coöperation.

29. In a printing and bronzing machine, the combination with a single impression-drum, of a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, a bronze-applying device, and means for simultaneously bringing the size-applying cylinder and the bronze-applying device and the impression-drum into and out of coöperation.

30. In a printing and bronzing machine, the combination with a single impression-drum, of a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, a bronze-applying device, and means for simultaneously bringing the size-applying cylinder and the bronze-applying device and the impression-drum into and out of coöperation, said means including a series of radial arms connected for operation with the size-applying cylinder and the bronze-applying device, and means for operating said arms.

31. In a printing and bronzing machine, the combination with an impression member, of one or more printing-surfaces, a size-applying surface, mechanism for simultaneously bringing said surfaces and the impression member into and out of coöperation, and bronzing and dusting devices.

32. In a printing and bronzing machine, the combination with a single impression-drum having a continuous impression-surface of one or more rounded printing-surfaces arranged on the impression-face of the drum, and a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, the printing-surfaces and the bronzing-cylinder being positively driven with the drum, mechanism for simultaneously bringing said surfaces and the impression-drum into and out of coöperation, and bronzing devices and dusting devices.

33. In a bronzing-machine, the combination with an impression member, of a size-applying surface, a bronze-applying device and means for simultaneously bringing the size-applying surface and the bronze-applying device and the impression member into and out of coöperation, and dusting devices.

34. In a printing and bronzing machine, the combination with a single impression-drum, of a cylinder having a printing-surface for applying the bronze size arranged on the impression-face of the drum, a bronze-applying device, and means for simultaneously bringing the size-applying cylinder and the bronze-applying device and the impression-drum into and out of coöperation, said means including a series of radial arms connected for operation with the size-applying cylinder and the bronze-applying device, and means for operating said arms, and dusting devices.

35. In a printing and bronzing machine, the combination, with an impression mem-

ber, of one or more printing-surfaces, a size-applying surface, mechanism for separating said surfaces and the impression member and bringing them into coöperation always in the same predetermined position, and bronzing devices.

36. In a bronzing-machine, the combination with an impression member, of a size-applying surface, a bronze-applying device and mechanism for separating the size-applying surface, the bronze-applying device and the impression member and bringing them into coöperation always in the same predetermined position.

37. In a bronzing-machine the combination, with a paper supporting and conveying member, of a bronze-applying member, an independent dusting or cleaning member, and mechanism for simultaneously bringing said bronzing and dusting members and the paper-supporting member into or out of coöperation.

38. In a bronzing-machine, the combination with a drum to support and convey the paper, of a bronze-applying member, an independent dusting or cleaning member, and a series of radial arms connected for operation with the bronzing and dusting members, and means for operating said arms, whereby the bronzing and dusting members and the drum are brought simultaneously into or out of coöperation.

39. In a bronzing-machine, the combination with a paper supporting and conveying member, of a bronze-applying member, an independent dusting or cleaning member and mechanism for separating said bronzing and dusting members and the impression member and bringing them into coöperation always in the same predetermined position.

40. In a bronzing-machine, the combination with a paper supporting and conveying member, of a size-applying surface, a bronze-applying member, an independent dusting or cleaning member, and mechanism for simultaneously bringing said sizing, bronzing and dusting members and the paper-supporting member into or out of coöperation.

41. In a bronzing-machine, the combination with a drum to support and convey the paper, of a size-applying surface, a bronze-applying member, an independent dusting or cleaning member, and a series of radial arms connected for operation with the sizing, bronzing and dusting members, and means for operating said arms, whereby the sizing, bronzing and dusting members and the drum are brought simultaneously into or out of coöperation.

42. In a bronzing-machine, the combination with a paper supporting and conveying member, of a size-applying surface, a bronze-applying member, an independent dusting or cleaning member, and mechanism for separating said sizing, bronzing and dusting members and the impression member and bringing them into coöperation always in the same predetermined position.

43. In a printing and bronzing machine, the combination with a paper supporting and conveying member, of one or more printing-surfaces, a size-applying surface, a bronze-applying member, an independent dusting or cleaning member, and mechanism for simultaneously bringing said printing, sizing, bronzing and dusting members and the paper-supporting member into and out of coöperation.

44. In a printing and bronzing machine, the combination with a paper supporting and conveying member, of one or more printing-surfaces, a size-applying surface, a bronze-applying member, an independent dusting or cleaning member, and mechanism for separating said printing, sizing, bronzing and dusting members and the impression member and bringing them into coöperation always in the same predetermined position.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD HETT.

Witnesses:

G. T. DONALDSON,
EDWIN SEGER.