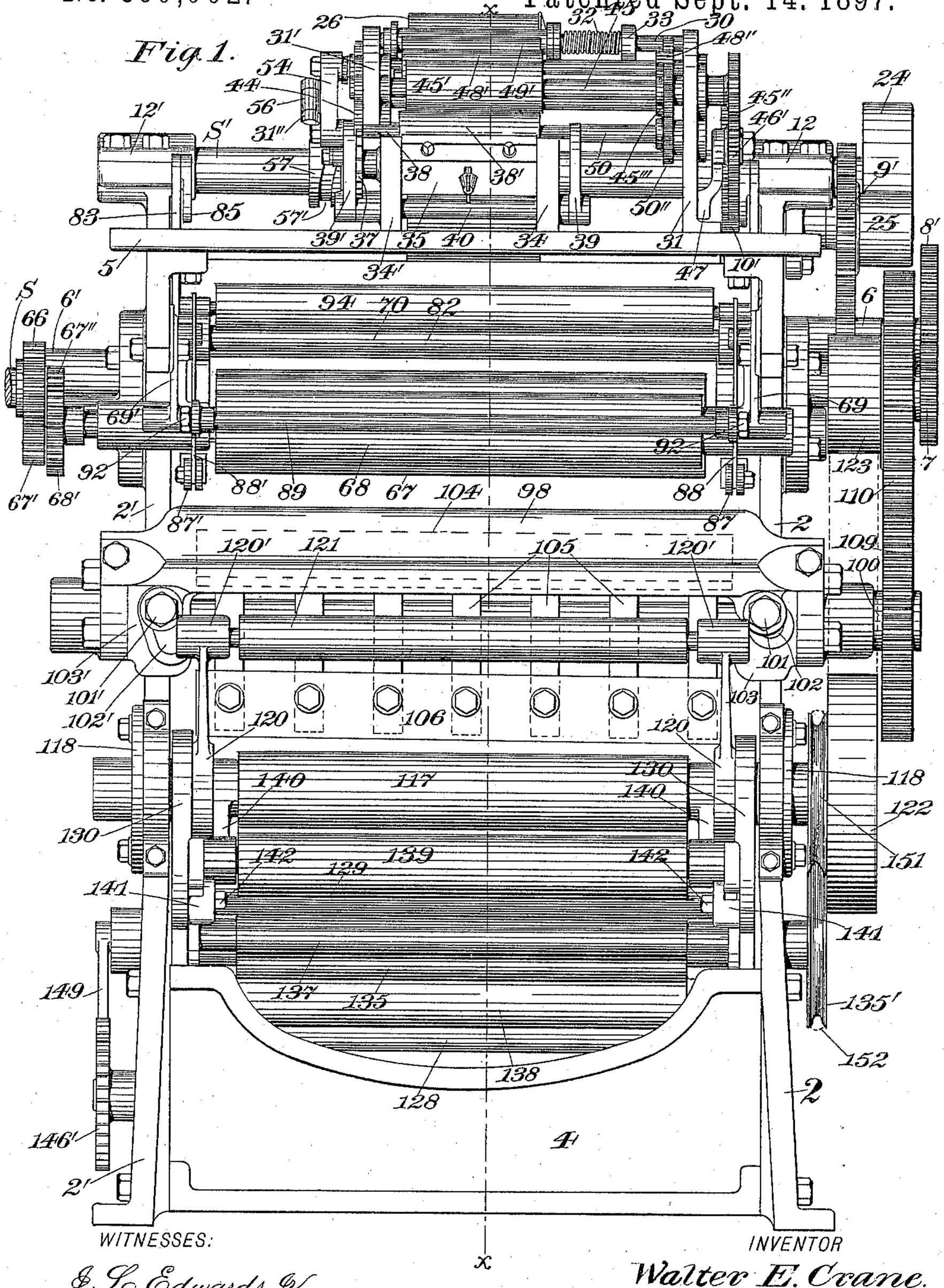
(No Model.) 5 Sheets—Sheet 1.

W. E. CRANE.

PRINTING MACHINE.

No. 590,002. Patented Sept. 14. 1897.

Fig. 1.



WITNESSES:

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ATTORNEY.

(No Model.)

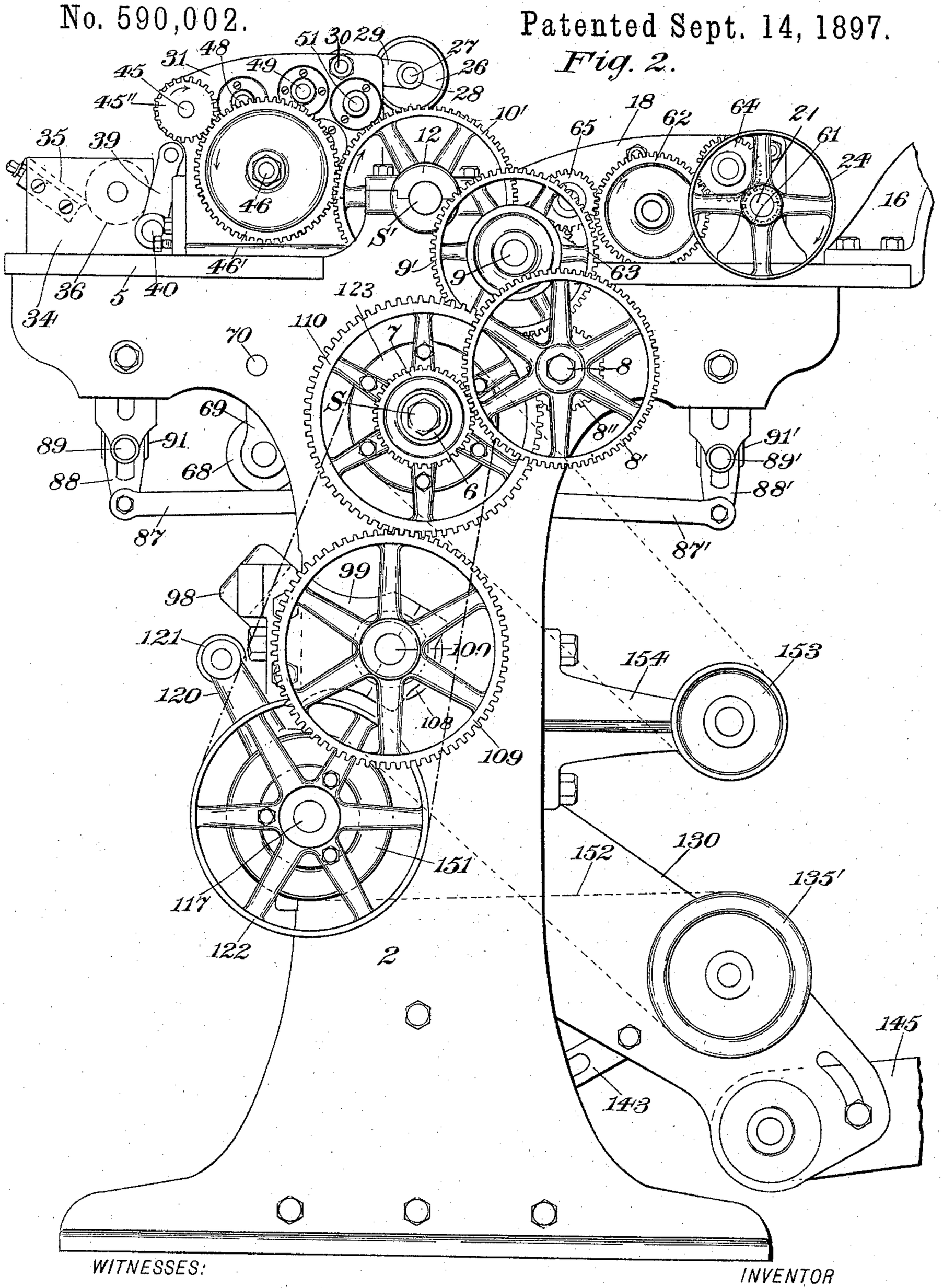
5 Sheets—Sheet 2.

W. E. CRANE.

PRINTING MACHINE.

No. 590,002. Patented Sept. 14, 1897.

Fig. 2.



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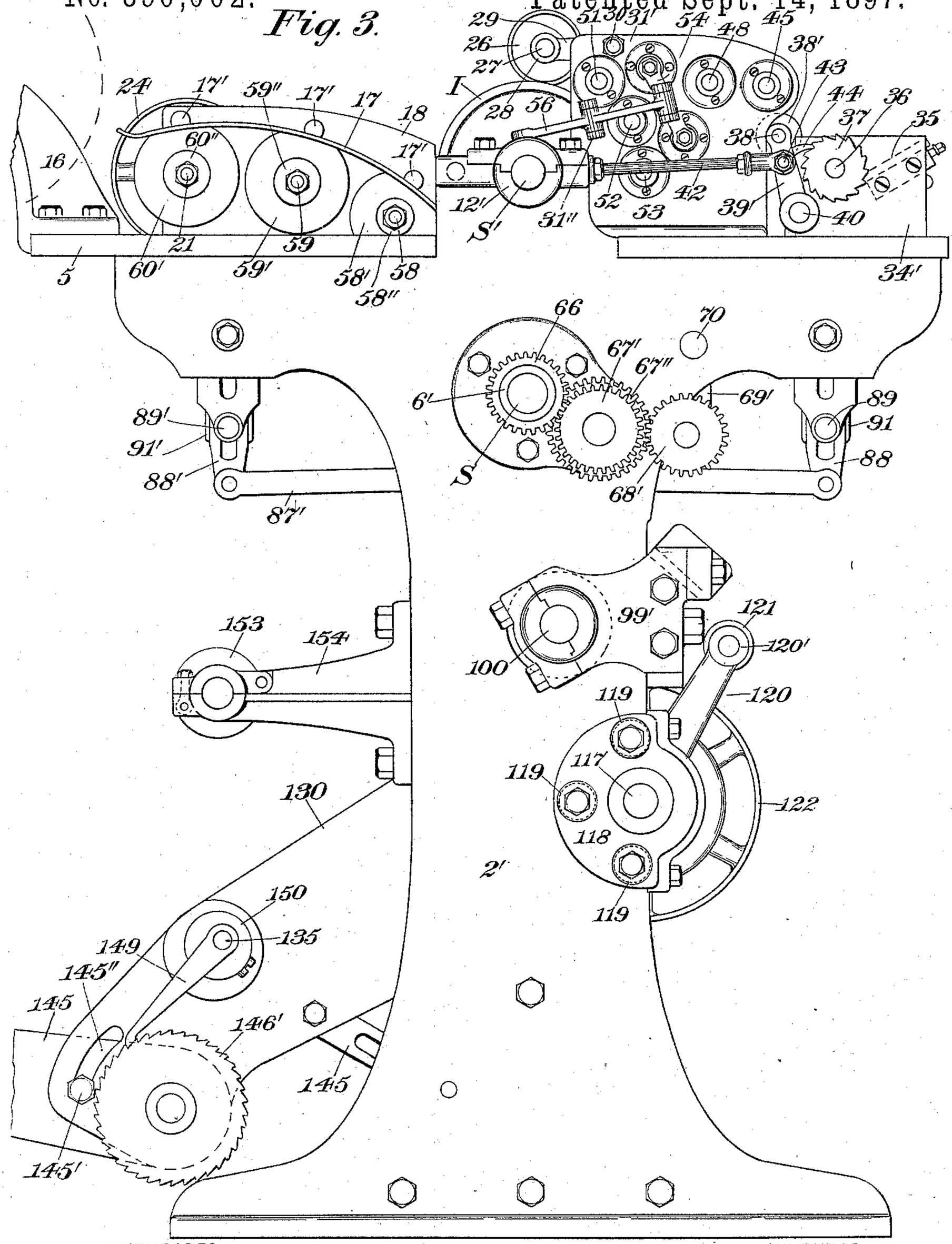
(No Model.) 5 Sheets—Sheet 3.

W. E. CRANE.

PRINTING MACHINE.

No. 590,002. Patented Sept. 14, 1897.

Fig. 3.



WITNESSES:

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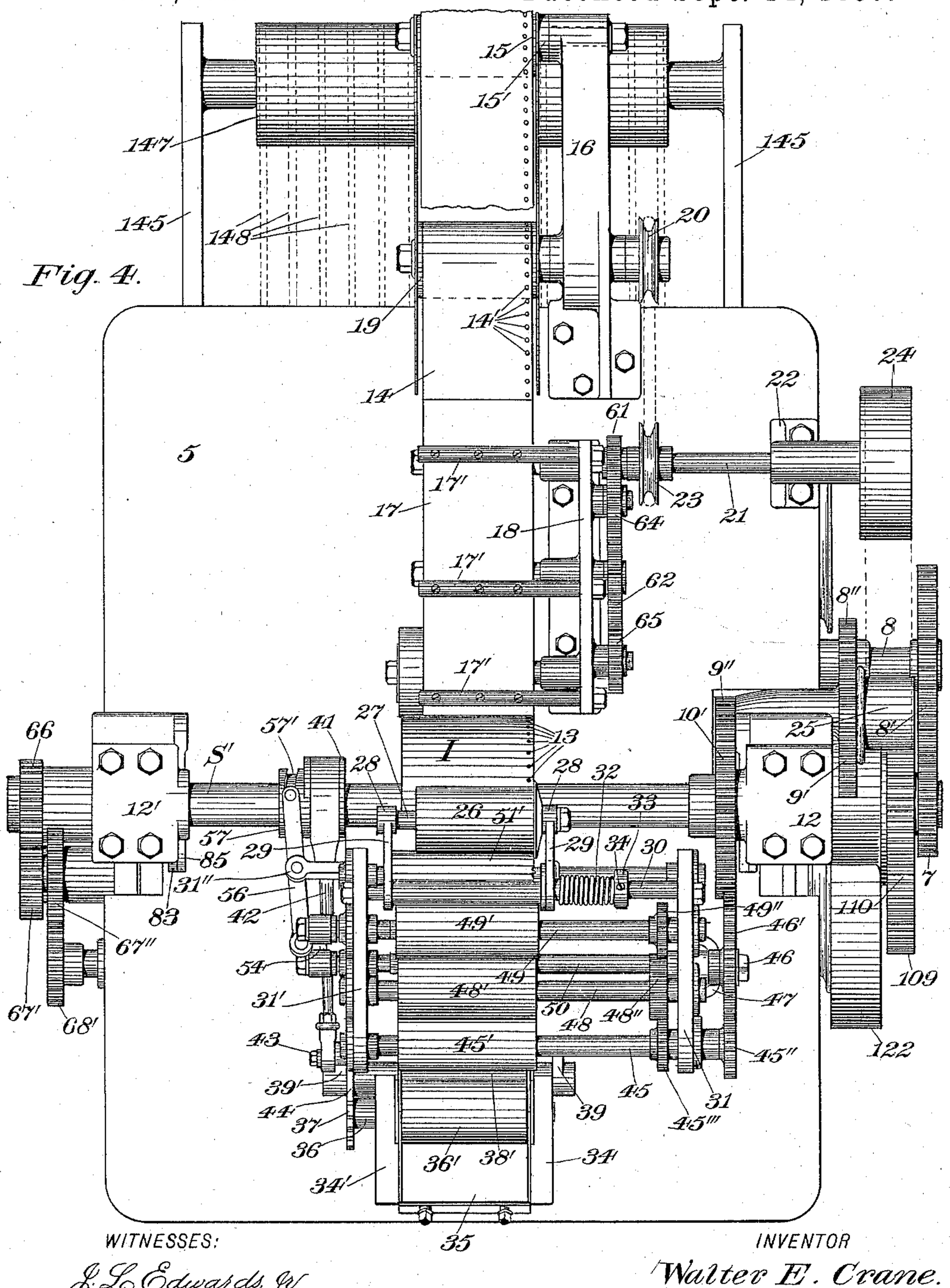
(No Model.) 5 Sheets—Sheet 4.

W. E. CRANE.

PRINTING MACHINE.

No. 590,002. Patented Sept. 14, 1897.

Fig. 4.



WITNESSES:

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(No Model.) 5 Sheets—Sheet 5.

W. E. CRANE.

PRINTING MACHINE.

No. 590,002. Patented Sept. 14, 1897.

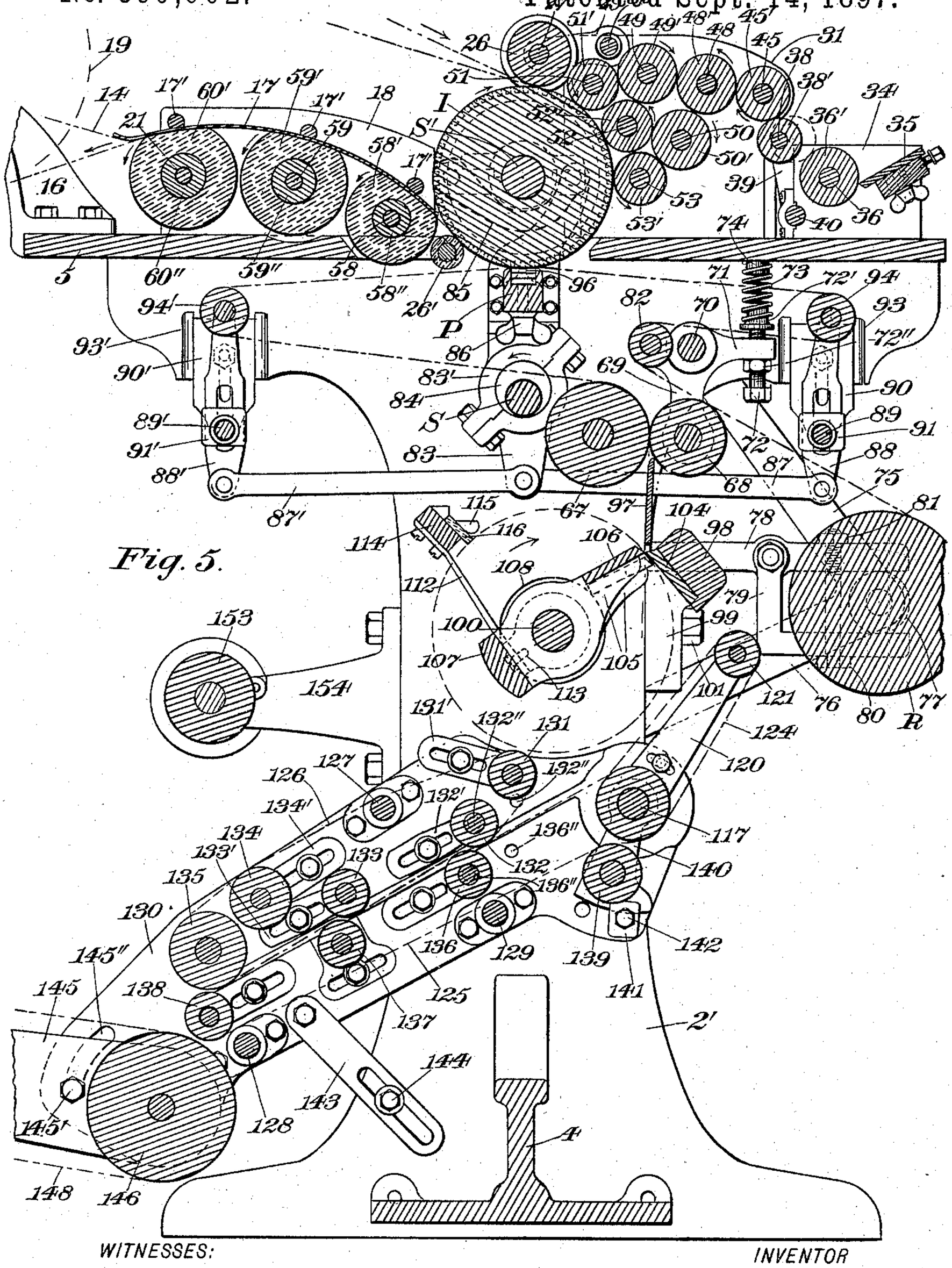

Fig. 5.

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UNITED STATES PATENT OFFICE.

WALTER E. CRANE, OF HARTFORD, CONNECTICUT.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 590,002, dated September 14, 1897.

Application filed July 9, 1895. Serial No. 555,390. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. CRANE, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

This invention relates to printing-machines, the object being to furnish in a machine of this class an improved organization of mechanisms adapted for printing upon a continuously-moving web of paper a series of impressions spaced at predetermined distances from one another and at relatively great distances apart as compared with the distances between the successive series of type-faces carried by the type-form through the agency of which the impressions are produced.

This invention is especially adapted and intended for use in obtaining impressions from a printing-strip—such, for instance, as is produced in the manner described and claimed in my prior applications, No. 509,985, filed May 3, 1894, and No. 511,910, filed May 21, 1894—which strip is in the nature of a thin metallic sheet having characters formed in relief thereon to obtain a printing-surface; and the object of my present invention is to secure from a form—such, for example, as the printing-strip described—having such a succession or any list of addresses in relief thereon a series of reproductions or a list of different superscriptions or addresses preferably spaced at wide predetermined intervals upon a web of paper that a plurality of wrappers—such as are usually employed for inclosing newspapers, periodicals, &c.—may be cut subsequently to the production of the successive printed impressions and then formed into a pile for convenient handling.

A further object of my invention is to provide, in connection with a printing-machine, an improved inking mechanism whereby an even distribution of the ink may be obtained over a relatively small type-surface irrespective of the size of the inking member, and the uniformity of the inking operation thereby assured.

Another object of my invention is to furnish, in connection with web-feeding mechanism for passing a continuous strip of paper through the machine at a predetermined rate of movement and with means for severing such strip at predetermined points in its movement for thereby forming wrappers of a predetermined length, a sheet-delivery mechanism embodying means for receiving the wrappers after they are cut from the web and for slowing down the movement of such wrappers to form a pile which may be conveniently handled by an attendant.

Another object of my invention is to furnish an improved wiping mechanism whereby after the printing-strip has passed beyond the impression members the printing-face thereof will be thoroughly cleaned or wiped, and said strip will be caused to emerge from the machine in substantially the condition in which it was on entering the same.

In the drawings accompanying and forming part of this application, Figure 1 is a front elevation of a printing-machine embodying my present improvements, the paper-roll carrier and the supporting and retarding devices therefor being removed to more clearly show the construction. Fig. 2 is an end elevation of the same as seen from the right hand in Fig. 1. Fig. 3 is an end elevation of the same, looking from the left hand in Fig. 1. Fig. 4 is a plan of the machine; and Fig. 5 is a substantially central vertical section of the machine, the section being taken in line *x x*, Fig. 1.

Similar characters designate like parts in all the figures of the drawings.

The operative mechanisms of a machine embodying my present improvements will be carried by some suitable framework. In the preferred form thereof herein shown and described the main framework is illustrated as having a pair of uprights or end frames 2 and 2′, connected at their upper sides by a table 5 and at their lower sides by a tie-bar 4, adjacent to the bed of the frame.

The main driving-shaft for actuating the several operative details is shown at S journaled in bearings 6 and 6′ in the end frames 2 and 2′ of the main frame. This main shaft is shown as carrying at 7 a pinion fixedly secured thereto and meshing with a gear-wheel 8′, journaled upon a stud 8, secured to one of the end frames. The gear-wheel 8′ is also shown as having a pinion 8″, secured thereto

and meshing with teeth of a gear-wheel 9′, fixedly secured to a shaft 9, also journaled in bearings at the same end of the framework and carrying in turn a pinion 9″, which engages the teeth of a gear-wheel 10′, fixedly secured to a driven shaft S′, mounted directly above the driving-shaft S and journaled in bearings 12 and 12′ in the tops of the end frames 2 and 2′.

The driven shaft S′ forms the means for imparting movement to the mechanisms located above the top plate and is shown as having fixedly secured thereto a strip-carrying roller or impression member I in the form of a drum of large diameter, and this drum is illustrated as having at one end thereof a circuit of equidistantly-disposed indentations 13, which are adapted to engage a series of corresponding projections carried by a printing-strip from which impressions are to be taken.

The strip or form employed in the present case is preferably of the character described in my prior applications hereinbefore referred to and is shown as consisting of a strip or sheet 14, which, it will be understood, will usually be of thin sheet-brass having projections 14′ on one face thereof and oppositely-disposed character-forming projections on the other face thereof, so that the carrying members or projections of the strip will, when the machine is in operation, be engaged by the corresponding indentations of the impression member I, while the character-forming projections of the strip will be on the opposite or outer face of the sheet in position to be inked and to print upon a traveling web of paper moving between the strip and a second impression member, which will be hereinafter more fully described.

The printing-strip 14 is shown in the present case as wound upon a carrier-roll 15, carried by a stud 15′, secured to the outer end of a bracket 16, rising from the rear end of the top plate 5 of the main frame. The strip 14 is fed into the machine over the upper side of the impression-cylinder I and is carried out around the under side of said cylinder and also along the under side of a guide-plate 17, fixedly secured to a standard or upright 18, rising from the top plate 5 and shown herein as bolted thereto. The bracket 16 is also illustrated in the drawings as having a shaft journaled therein at 19′ and carrying a second or receiving reel 19 for the strip. The shaft 19′ is shown as guided in lateral direction by means of the usual collars abutting against the opposite ends of the bearing for the shaft and as also having fixedly secured thereto at one end a driving-pulley 20, controlled from a shaft 21, journaled at its opposite ends, respectively, in the standard 18 and a bracket 22 and carrying a similar driving-pulley 23. The shaft 21 is shown in the drawings as driven by a band-wheel 24, controlled by a belt passing over a driving band-wheel 25, fixedly secured to the shaft 9, which is controlled from the main driving-shaft S.

It will be understood, of course, that a sufficient portion of the printing-strip 14 is left blank at the end which enters the machine to permit attachment of said strip to the receiving-drum 19 before the printing operation is begun and that the peripheral movement of the receiving-reel is at the same rate as that of the impression member I, in order that the strip may be properly rewound after it has passed out of the machine, the delivery-reel 15 being of course driven by the pull of the strip itself and not being geared directly to any portion of the driving mechanism. This delivery-reel is therefore simply in the nature of a follower, while the receiving-reel is driven by a belt capable of slipping even when rotating at its highest speed—as, for instance, when only a small portion of the strip has been rewound.

For maintaining the printing-strip in engagement with the drum I prefer to employ means independent of the devices hereinbefore described for pressing the printing-strip directly against the impression member I. One form of device for attaining this result is shown at 26 as a pressure-roll fixedly carried by a shaft 27, mounted for rotation in bearings 28, carried in the ends of the lateral arms 29 of a yoke which is sleeved upon a cylindrical rod or carrier 30, carried at its opposite ends by the uprights or brackets 31 and 31′, which are shown as rising from the top plate 5. As a means for varying the pressure exerted by the roll 26 upon the printing-strip a torsion-spring is shown at 32 secured at one end to one of the arms 29 of the yoke for the pressure-roll and is secured at its other end to an adjusting-collar 33, mounted upon the carrier 30 and adapted to be turned thereon, a set-screw 34 being shown for binding said collar to the carrier in any of its adjusted positions to thereby secure the desired amount of pressure upon the printing-strip and the cylinder I. A second pressure-roll may be employed, if desired, to engage the strip at the point of egress from the impression members and is shown at 26′. I do not, however, consider this roll as essential, as the tension upon the strip due to the rotation of the receiving-reel 19 will usually be found sufficient to maintain said strip in contact with the cylinder I around the under side thereof.

The pressure-roll 26 is substantially a rigid cylinder, but is preferably provided with a thin covering of flexible material, such as rubber, for the purpose of compensating for any slight unevenness of engagement between the walls of the indentations 13 in the impression-roller I and the complementary projections 14′ of the printing-strip, and thereby maintains the strip in constant geared connection with the driver or impression-roll I.

For the purpose of inking the type-form or

printing-strip as the same passes around the impression-cylinder I the preferred form of mechanism from which I have secured the best results is one in which an even distribution of the ink upon the type-surface may be obtained, irrespective of the area of such surface, and which will also prevent the crawling of the inking member or members upon the face of such type-form. One form of devices for attaining these results is shown as mounted upon the forward end of the top plate 5 of the machine and as supported between suitable uprights or brackets, such as 34 and 34′, and the brackets previously described and designated, respectively, by 31 and 31′. The uprights 34 and 34′ form the side walls of the usual ink-fountain and support the usual obliquely-adjustable doctor 35 in operative relation with a doctor-roll 36′, carried by a shaft 36, journaled at its opposite ends in the brackets 34 and 34′ and carrying at one end a ratchet 37, fixedly secured thereto for rotating the doctor-roll. As a means for transferring the ink from the doctor-roll to the distributing-rolls, which will be hereinafter described, I have shown herein a transfer-roll 38′, carried upon a transverse shaft 38, which is mounted for rotation in bearings formed in the upper ends of a pair of rock-arms 39 and 39′, fixedly secured to a rock-shaft 40, journaled at its opposite ends at the rear sides of the brackets 34 and 34′.

The doctor-roll and the transfer-roll are illustrated in the drawings as operated from the main or upper driven shaft S′ by means of an eccentric 41, controlling an eccentric-rod 42, which is pivoted at its forward end to the rock-arm 39′ by means of a stud 43, which is also shown as carrying a pawl 44 in position for engaging the teeth of the ratchet-wheel 37 on the successive actuations of the rocking frame by the eccentric-rod.

The primary distributing-roll, by means of which the ink is taken from the transfer-roll 38′, is shown at 45′ as carried for rotation with a shaft 45, which is journaled at its opposite ends in the forward ends of the uprights or brackets 31 and 31′. This distributing-roller is illustrated in the present case as driven directly from the main upper driven shaft S′ and as constituting the means for rotating in turn the several other inking-rollers, which are illustrated as constituting parts of the inking apparatus. In the present case the distributing-roller 45′ is shown as driven by a pinion 45″, carried upon the outer end of its shaft 45, which pinion is illustrated as driven from a gear-wheel 46′, carried by a short stud 46, secured to a smaller bracket 47, this gear-wheel being shown as driven by the gear-wheel 10′, carried by the shaft S′. The inking mechanism is also preferably provided with a plurality of secondary ink-distributing rollers driven from the primary distributing-roller 45′, three of these rollers being shown herein at 48′, 49′, and 50′ as carried by corresponding shafts 48, 49, and 50, mounted at their respective ends for rotation in bearings in the brackets 31 and 31′ and in parallelism with the primary distributing-roller. The shaft 48 is shown as carrying a gear-wheel 48″, having a relatively wide working face, this gear being shown as operated from a gear-wheel 45‴, secured to the shaft 45 of the primary distributing-roller. The shafts 49 and 50 are illustrated as carrying gear-wheels 49″ and 50″, respectively, having relatively narrow faces, these gear-wheels being adapted to mesh with the teeth of the wide gear-wheel 48″, so that the rolls 49′ and 50′ will rotate in the same direction.

The two secondary distributing-rollers 49′ and 50′, which derive their movements from the primary distributing-roller 45′, are preferably metallic rollers, so that the peripheral surface thereof will be non-yielding.

As a means for inking the type-form or type-surfaces of the printing-strip, I have shown as a part of the inking mechanism three rollers (designated, respectively, by 51′, 52′, and 53′) carried, respectively, by corresponding shafts 51, 52, and 53, journaled at their opposite ends in the brackets 31 and 31′, preferably adjustably. These inking-rolls 51′, 52′, and 53′ are not, however, non-yielding, as is the case with some of the other inking-rolls of the series described, but are of the type generally known as "composition" rolls, which are peripherally yielding and will therefore give slightly in passing over the type-faces and thereby thoroughly distribute the ink upon the type-form. It will be understood, however, that this yielding action of the composition rollers will not be sufficient to cause a distribution of the ink upon the non-impressing faces of the strip.

All of the rollers 51′, 52′, and 53′ are shown (see Fig. 5) as in frictional engagement with the secondary distributing-rollers 49′ and 50′ and as slightly separated, peripherally, from one another to thereby permit the rotation of these three composition rollers in the same direction, as will be apparent by reference to said figure. As all of these impression-rollers are in contact with the strip upon the impression-cylinder I, they should of course have the same speed of peripheral movement as said strip upon the impression-cylinder. It will be obvious that the gears should be so proportioned that the secondary distributing-rollers 49′ and 50′ will have equal rates of peripheral movement to that of said cylinder. Hence if the rollers 51′, 52′, and 53′ shrink during use, as is generally the case, by adjusting the parts so as to maintain such composition rollers constantly in engagement with the cylinder I and the rolls 49′ and 50′ the same rate of peripheral movement will be maintained, although the speed of rotation of the form-inking rollers will be increased. In order to compensate for the skrinking of these composition rollers, the brackets 31 and 31′ and 34 and 34′ are preferably movable longitudinally of the machine and may be se-

cured in place by the usual bolts passing through suitable slots in the top plate of the machine and secured in place by nuts in the usual manner.

In order to more thoroughly distribute the ink over and around the composition rollers, the secondary distributing-rollers are preferably actuated to have longitudinal or reciprocatory, as well as rotary movements. Any suitable means may be employed for this purpose; but in the preferred form thereof herein illustrated I have shown the shafts 49 and 50 as passing, at the ends thereof opposite the gearing previously described, through a yoke 54, which yoke is illustrated herein as working between suitable stop-collars secured to said shafts and as having a pivotal connection with the forward end of an actuating-lever 56, which is pivoted in turn to a projecting arm 31″, carried by the bracket 31′, said lever being shown as having at its opposite end a stud and roller working in a cam-groove 57′ of a cam-wheel 57, carried by the driven shaft S′. It will be obvious that on the rotation of this shaft the lever 56 will be oscillated about its pivot and will thereby reciprocate the secondary distributing-rollers 49′ and 50′ longitudinally, the wide teeth of the actuating gear-wheel 48″ for these rollers serving to maintain the driven gear-wheels 49″ and 50″ in constant engagement with the teeth of said driving-gear.

After the printing-strip emerges from between the impression members the ink may be removed therefrom by any suitable wiping mechanism. That which I have shown herein embodies a plurality of wiping members or rolls in contact with and movable in relation to the printing-face of the strip or member to be wiped, so as to wipe in alternately opposite directions, the strip being held at its rear face by contact against the under side of the guide-plate 17, hereinbefore referred to. The guide for engaging the rear side of the strip may be of any suitable construction, but is preferably formed as shown in the drawings, in which the guide-plate 17 is illustrated as fixedly secured to a series of horizontally-disposed guide-carrying arms 17′, which may be made fast in any well-known manner to the standard 18 or may be formed integral therewith. The wiping-rolls, which are designated herein by 58′, 59′, and 60′, are shown in the drawings as having their wiping or outer surfaces formed of yielding material carried upon substantially rigid inner rollers—such as 58″, 59″, and 60″—which in turn are fixedly secured to corresponding shafts 58 and 59 and the shaft 21, which are mounted for rotation in bearings carried by the bracket 18. At the ends thereof which are adjacent to such bracket these shafts are shown as provided with gear-wheels 61, 62, and 63, connected by idler-wheels 64 and 65, carried upon studs which are also mounted on the bracket 18. The gear 61 is shown as constituting the driver for this train of gearing and, as is obvious, will be driven by the rotation of the band-wheel 24. The two gears 61 and 63 are of relatively small diameter, while the gear-wheel 62, which drives the intermediate wiping-roller, is shown as of relatively large diameter, whereby the two outer wiping-rollers, it will be seen, will be driven at a relatively rapid speed, while the rotation of the intermediate roller will be at a relatively slow rate. In the present case the rate of peripheral movement of the wiping-rollers 58′ and 60′ is faster than the rate of advancement of the printing-strip, while the peripheral speed of the wiping-roller 59′ is considerably slower than such advancing movement of said strip, so that the alternating wiping members or rollers will have, respectively, faster and slower advancing or peripheral movements, the outer rollers wiping the strip in one direction—that is, in a direction corresponding with the direction of egress of the strip from the machine—while the inner roll will wipe the strip in a direction in opposition to the direction in which the strip withdraws from the machine.

In practice I prefer to construct the wiping-rollers in such a manner that they may be readily placed upon and removed from their respective driving-shafts for the purpose of renewing the cylinders when the same become worn and for cleaning the same from time to time. The wiping-face or yielding portion of each of these rollers is shown in the drawings as formed of material which will be considerably flattened while rotating in contact with the printing-strip, the rollers being preferably made up of a plurality of disks of cloth or other suitable material for cleaning a form.

The main driving-shaft is shown as having at the end thereof carrying the driving-pulley (not shown) a gear-wheel 66, having a geared connection with the feeding means or feed-rollers, by means of which the speed of movement of the web of paper is controlled as the sheet passes through the machine. In the present case the main feed-roller is shown at 67 as having upon the outer end of its shaft, which is journaled in suitable bearings in the end frames 2 and 2′, a pair of gear-wheels 67′ and 67″ in mesh, respectively, with the gear-wheel 66 and with a gear-wheel 68′, carried by the other feed-roll 68. This latter feed-roll is shown in the drawings as mounted for rotation in bearings carried by rock-arms 69 and 69′, fixedly secured to a rock-shaft 70, journaled in bearings in the end frames.

The feed-rollers constitute feeding means operative for feeding the web of paper into and away from the machine at the same rate of speed.

For the purpose of adjusting the position of the roll 68, which constitutes the pressure-roll of the pair, relatively to the other feed-roll 67 the rock-arms 69 and 69′ are also illustrated as having fixedly secured thereto lugs 71, vertically bored for the reception of adjusting-screws 72, carrying at the point thereof a flanged cap-piece 72′, around which one

end of a coiled spring 73 is passed, the other end of said spring being shown as received by a superposed pin or boss 74, depending from the under side of the top plate 5. It will be understood that more than one of these adjusting devices will be employed and that by turning the screws 72 and properly adjusting the check-nuts 72″ any desired amount of tension upon the pressure-roll 68 may be obtained.

For the purpose of controlling the speed with which the web of paper is fed through the machine the gears 66 and 67′ may be changed and other gears having a different ratio of speed transmission substituted therefor, so as to obtain any desired rate of peripheral movement of the feed-rolls, and thereby also the required length of wrapper.

The paper-roll R, from which the wrappers are to be formed and upon which addresses or other matter is to be printed, may be mounted at any suitable place adjacent to the machine, but is herein shown as preferably carried by a roller mounted in bearings upon an auxiliary supporting-frame carried at the forward side of the machine. In the drawings the paper-roll carrier is shown at 77 as mounted in the bearings of a frame or bracket formed by arms 75 and 76, one of which brackets is carried adjacent to each end of the machine. For the purpose of preventing an uneven or racing movement of the paper-roll and thereby preventing slacking of the web the paper-roll carrier is shown herein as having a stress exerted thereon by retarding means preferably in the form of a friction-clamp. In the present case this friction-clamp is shown as comprising an arm 78, fixedly secured to a suitable portion of the frame of the machine, and a similar arm 79, pivotally connected at one end to the arm 78 of the clamp. For the purpose of tightening the two arms of the clamp upon the carrier 77 these arms are shown as adjusted and connected by a bolt 80 and a holding-nut 81.

As the moving web of paper enters the machine from the paper-roll R it first passes over a guide-roll 82, which is journaled at its opposite ends in the arms 69 and 69′ of the rocking frame, which carries the pressure feed-roll 68, and the traveling sheet then passes around the take-up rollers of a speed-modifying or web-take-up mechanism before reaching the feed-rollers, which have just been described as operative for advancing the paper through the machine.

The impression member or platen, by means of which the paper is pressed against the impression-face of the type-form or printing-strip, is shown herein at P as carried by arms or levers mounted on eccentrics, preferably integral with the main driving-shaft S. These arms are illustrated herein at 83 as substantially vertically disposed and as having bearings 83′, in which the eccentrics 84 rotate. The upper ends of the arms 83 are illustrated as curved, to avoid interference with the shaft S′, and as having pivotal connections with links 85, of a bent or curved form, which pass under the shaft S′ and are pivotally secured at their rear ends to a fixed portion of the frame.

The platen proper is preferably in the form of a channeled bar fixedly secured to the arms 83 and substantially rigid, so as to prevent springing thereof. In the channel of the platen-bar, which channel is shown formed in the face of the platen, I preferably build up several strips of flexible material supported upon a metallic strip in the bottom of the groove, adjusting-screws being shown at 86 as passed through the under side of the platen-bar for slightly raising these strips when necessary to secure a true impression-surface.

The take-up mechanism, by means of which the movements of the web in passing through the machine are modified, is shown herein as operated from the lower ends of the arms 83, connecting-rods 87 and 87′ being illustrated as pivoted to these arms at their lower ends and as also having pivotal connections with the lower ends of levers or rock-arms 88 and 88′, which carry the take-up members or rollers. These levers are also illustrated as adjustably clamped to rock-shafts 89 and 89′, journaled in bearings in adjustable supports 90 and 90′, carried by the main frames 2 and 2′, it being understood that the construction shown in Fig. 5 is duplicated at the opposite end of the machine. (See Figs. 2 and 3.) At the points where the rocking levers 88 and 88′ are secured to the shafts 89 and 89′ each of these shafts has a reduced portion on which is fixedly mounted a collar, such as 91 or 91′, having a transverse guideway in its outer face, in which the rock-arm is seated and may be adjusted longitudinally therewith, a check-nut, such as 92, being shown mounted on a threaded portion of each of the reducing ends of the rock-shafts to thereby clamp the rock-arm against the collar to hold these parts in fixed engagement with one another. The bearings in which the ends of the rock-shafts are mounted for oscillation are illustrated in the drawings as carried at the lower ends of the supports 90 and 90′, which are shown as vertically adjustable in guides 93 and 93′ in the end frames of the machine, the supports being adjustably secured in any desired vertical position by means of bolts passed through slots in the adjustable supports or hangers and held in place by clamp-nuts in the usual manner. At the upper ends of the rock-arms or levers 88 and 88′ the take-up members or rollers, which act directly upon the moving web of paper to modify the movements of the same, are shown as mounted for rotation in suitable bearings.

The relative proportions of the several gears in the train of gears from the main driving-shaft S to the driven shaft S′ are such that the driven shaft will only make a small portion of a revolution for each revolution of the

driving-shaft, and in practice it has been found convenient to let this equal the one twenty-fourth part of a revolution and to place the addresses upon the strip at such distances apart that twenty-four of them will pass a given point during one revolution of the impression-cylinder, and hence one address will be presented to the platen at each revolution of the driving-shaft S. With reference to this slow advancing movement of the printing-strip it is desired to have the paper upon which the addresses are to be imprinted advance at a much greater rate or a whole wrapper-length, and this advance should be at a uniform and predetermined rate, and the rate of movement of the paper as it leaves the roll should be uniform and substantially the same as the peripheral movement of the feed-rolls; but as it is necessary to slow down the rate of advance of that portion of the paper upon which an impression is to be made to precisely the rate of advance of the printing-strip in order that the impressions shall not be blurred I have provided the two similar sets of take-up devices before mentioned which oscillate in unison with each other and in unison with the eccentric upon the main shaft, by means of which the impressions are made, and by this oscillatory movement an alternate acceleration and retardation of that portion of the paper between the said take-up rolls is caused, the retarding effect being sufficient to compensate for the difference between the rate of advance of the printing-strip and the normal rate of advance of the web of paper and the acceleration being sufficient to compensate for the retardation. This take-up is rendered sufficient by reason of the multiplying action of the arms 83 upon the rock-arms 88 and 88′, and by reason also of the doubling of the paper about the take-up rolls, as shown, equal and synchronous retarded or accelerated movements in the same direction being imparted to the take-up members or rolls by means of the eccentrics through their connections with said take-up rolls.

The friction-clamp before mentioned prevents the paper-roll from rotating faster than the feed-rolls require the paper to advance, and thus prevents slack in the paper.

The movements of the mechanisms are so timed that as the platen reaches the extreme upper position in its elliptical path and is brought to the impression-point the moving web of paper between the impression members will be traveling at its slowest rate of speed, which minimum rate of movement will be exactly equal to the rate at which the two impression members are moving, and at the moment the impression is produced the impression members and the paper will be advanced with equal speeds. This slowing down of the movement of the impression portion of the web is due to the tipping of the take-up rolls to the right, (seen in Fig. 5,) the throw of the eccentric 84 and the movements of the several levers operated thereby being so proportioned that any desired ratio between the movements of the paper and the printing-strip (within limits) may be obtained, so that the impressions may be produced upon the paper at greater or less distances apart, as desired. The movements of the take-up rolls will always be equal and in the same direction, and, therefore, a giving up of the paper by one of said rolls will always be compensated for by the taking up by the other roll of an equal portion of the web during the same period, so that whatever may be the rate of movement of the impression portion of the web relatively to the movement of the printing-strip the moving web will be constantly maintained taut at all points between the paper-roll and the feed-rolls.

If the rate of peripheral movement of the impression member I is assumed to be one and the constant rate of peripheral movement of the web at the feed-rolls and the paper-roll is sixteen when the impression portion of the web is slowed down to the speed of said impression members at the moment of impression, the take-up rolls will be moving to the right (see Fig. 5) at such a rate as to subtract fifteen-sixteenths of the movement of the impression portion of the paper and cause said impression portion of the web to advance at a speed only equal to that of the impression member I, and when the impression members are in their positions of maximum separation the take-up rolls will add to the normal rate at which the impression portion of the web is advanced by the feed-rolls an amount equal to that which was subtracted during the impression period in order to compensate for the loss of movement of the web during that half of a revolution in which the impression was previously made.

For the purpose of securing positive coaction of the platen and impression-cylinder during the printing moment I prefer to employ, in addition to the geared connections, locking means for positively controlling the positions of these members at such time. In the present instance I prefer to employ in connection with one or more locking members secured to the shaft S′ such as the gear-wheel 10′, (shown in Fig. 2 and in dotted line in Fig. 5,) a corresponding locking member or members in the form of a tooth or teeth, such as 96, suitably secured to the platen mechanism and preferably carried by the arm or arms 83. As the two impression members approach each other just prior to the imprinting of an address upon the moving web of paper this tooth or teeth will engage between corresponding teeth of the gear-wheel upon the shaft S′ and will positively lock the impression members against slipping at the moment of impression. It will be obvious that these teeth are so disposed that the tooth-spaces will come into positive vertical or radial alinement with the corresponding locking member or members at the printing moment.

After the paper is fed through the feed-rolls it is directed in some suitable manner—as, for instance, by means of a guide-plate 97—toward a cutter mechanism, by means of which the moving strip is cut into single sheets or wrappers of a predetermined length.

In the form thereof herein illustrated the cutting or shearing devices are shown as carried by a cutter-frame adjustably mounted between the end frames 2 and 2′ of the main frame and beneath the feed-rolls and the guide-plate. The preferred form of this mechanism is shown herein as embodying a frame having a shear-bar 98, fixedly secured to brackets or hangers 99 and 99′, which brackets have journal-bearings adapted to support for rotation a cutter-shaft 100. The cutter-frame as a whole is obliquely adjustable and is shown as adjustably secured to the forward sides of the frames 2 and 2′ by means of suitable fastening-bolts, such as 101 and 101′, passed through slots 102 and 102′, formed in lugs or shoulders 103 and 103′, which constitute parts of the cutter-frame, the bolts being held in their adjusted positions by nuts in the usual manner. The slots 102 and 102′ are shown obliquely disposed, and the latter as of greater length than the former, so that the frame may be adjusted up and down on the main frame of the machine, and also in radial direction relatively to the inner pitch-line of the gears 109 and 110, hereinafter described, as a center.

The cutter-bar 98 is shown herein as having adjustably secured thereto a stationary cutter or shear 104 the cutting edge of which is substantially adjacent to the lower edge of the guide-plate 97. As a means for cutting the moving web of paper into sheets or wrappers of a determined length as successive portions of the web pass the edge of the shear 104 the shaft 100 is shown as having fixedly secured thereto, for rotation therewith, a series of cutter-carrying arms 105, to the outer ends of which the movable cutter or shear blade is shown at 106 as bolted in such a position as to cut spirally or in a diagonal line, one end of the blade being about fifteen degrees ahead of the other, as will be evident by reference to Fig. 5. The arms 105 are also shown herein as connected at the ends thereof opposite the shear 106 by means of a balance-bar 107.

It will be obvious that in order to permit the vertical adjustment of the cutter-frame carrying the shaft 100 the end frames 2 and 2′ of the machine should be provided with openings, as shown at 108. This shaft is illustrated in the drawings as driven by a gear-wheel 109, secured to the end thereof and meshing with a corresponding gear-wheel 110, carried by the main driving-shaft, these two gears being of equal dimensions in order that the cutter-shaft may rotate at the same speed as the main driving-shaft S. As the angle at which the shear-blades cut the moving strip is regulable by the vertical adjustment of the cutter-frame it will be obvious that the gear-wheel 109 will be tipped slightly out of its true working position and will engage the teeth of the gear-wheel 110 at a slight angle to a vertical line, so that in case of a considerable tipping of the shear-frame the ends only of the gear-teeth will be in proper meshing engagement. This, however, is amply sufficient for properly rotating the shear, as I have found in practice.

The spiral disposition of the revolving blade will, it is evident, cause the severing of the successive strips from the web by a shear cut, while the vertical adjustment of the shear-frame as a whole will insure the obtainment of a straight cut across the paper with different rates of movement of the paper, the vertical position of the cutter-frame being altered by raising or lowering the same as the web is fed through the machine at a faster or slower rate of movement, corresponding to a lower or shorter length of wrapper.

For the purpose of preventing wear of the edges of the shear-blades I have shown herein an oiling device for oiling the rotating shear during its operation. The brackets 99 and 99′ are provided with lugs extending through the openings 108 in the end frames 2 and 2′, and to these lugs carrier-arms are shown at 112, secured by means of screws 113. These carrier-arms are also illustrated as supporting a bar 114, having secured thereto a trough 115 for carrying a supply of oil, a strip of felt or other yielding material being shown at 116 as secured in the outlet of said trough and closing said outlet, the edge of the strip being disposed in such position that it will touch the edge of the rotating shear-blade at each rotation thereof.

As the moving web is severed on successive lines as it passes between the shear-blades 104 and 106 the sheets separated therefrom fall and are received by a universally-adjustable sheet-delivery mechanism, by which they are formed into a pile for handling. In the preferred form thereof herein illustrated this sheet-delivery apparatus consists, essentially, of a sheet guiding or receiving mechanism and a sheet-transfer mechanism vertically and horizontally adjustable relatively to the main frame and a sheet-flier adjustable relatively to the transfer mechanism, all coöperating for piling the successive sheets. The sheet-guiding mechanism in the form thereof shown in the drawings is preferably carried by a shaft 117, carried by bearings 118, vertically and horizontally adjustable on the end frames 2 and 2′ by means of bolts passing through enlarged openings 119, (shown in dotted lines in Fig. 3,) in which openings said bearings may be floated, the bolts being screwed into the frames 2 and 2′. The shaft 117 is also shown as carrying at its ends a pair of arms 120, provided with bearings 120′ at their upper ends, in which bearings a roller 121 is shown as mounted for rotation. The arms

120, it will be understood, constitute the frame of the sheet-guide and are secured adjustably to side frames 130 of the sheet-transfer mechanism hereinafter described, so as to hold the same in proper position. The usual set-screws or clamping-screws may be employed for this purpose. The shaft or roller 117 also constitutes the driving-roller for the sheet-transfer mechanism and is illustrated herein as driven by a band-wheel 122, operated by a belt from a corresponding band-wheel 123, carried by the main driving-shaft S.

For the purpose of receiving and guiding the several sheets or wrappers endless traveling carriers or tapes are shown at 124 as carried around the rollers 117 and 121 and as continuously moving in the direction of travel of the paper.

The sheet-transfer mechanism, by means of which the sheets are conveyed to the sheet-flier or delivery-frame, is shown herein as embodying a plurality of oppositely-disposed carriers or tapes in two sets (designated by 125 and 126, respectively) and traveling in opposite orbital directions, so as to draw the sheets along between them. The tapes of these sets in the present instance are carried by a plurality of rollers mounted in the adjustable side frames 130, which are shown connected by means of tie-rods 127, 128, and 129. The rollers 131, 132, 133, and 134 are illustrated herein as mounted at their ends for rotation in bearings formed on the sets of links 131′, 132′, 133′, and 134′, adjustably secured to the side frames 130 by means of clamping-bolts, while a fixed roller is shown at 135 as constituting the lower terminal-roll for the upper series of tapes. The tapes of the lower set are shown herein as carried by the main driving-roller 117 and by the rollers 136, 137, and 138, mounted adjustably in substantially the manner just described with reference to the adjustable rolls carrying the upper series of tapes.

An additional adjustable roller for tightening the lower set of transfer-tapes is shown at 139 as mounted in bearings in strap rods or hangers 140, mounted on and depending from the opposite ends of the bearings of the driving roller or shaft 117. As a means for holding the roller 139 in any of its adjusted positions the side frames are shown herein as having clamping means, preferably in the form of clamping-blocks 141, frictionally engaging the inner sides of the lower ends of the hangers, as shown in Figs. 1 and 5, and secured in place by means of screws or bolts, such as 142.

The tapes of the upper and lower transfer series are preferably disposed in opposition in order to obtain a firm hold upon the successive sheets and also in alternation with the tapes 124, said transfer-tapes being driven at a considerably slower speed than the rate at which the web is traveling through the machine, and consequently slower than the movement of each of the severed sheets or wrappers as it falls upon the receiving-tapes.

The upper set of transfer-tapes holds the sheets firmly against the lower tapes 125 as the wrappers are received from the guide-tapes 124, and it will be apparent that in order to properly carry the wrappers, which, owing to the relatively-slower movement of these tapes as compared with the rate of movement of the paper-web, will slightly bank up upon one another and overlap, the transfer-tapes must be held taut during their traveling movements. All of the adjustable rollers may be properly set for this purpose, but usually it will be found sufficient for the purpose of taking up slack in these tapes to adjust only the carrier-rolls 131, 134, and 139.

As my improved machine is intended for use in handling sheets or wrappers of different lengths it will be apparent that some means must be employed for so adjusting the sheet-guide and the sheet-transfer mechanism that the severed sheets may be properly engaged and carried between the transfer-tapes, both when the machine is operating to cut sheets or wrappers of relatively short length and when the severed pieces are of relatively great length. Moreover, for different thicknesses and kinds of paper I have found that the angle at which the tapes move must be varied in accordance with the nature of the web. Hence both the frame for the guide-tapes and the frame for the transfer-tapes are illustrated as capable of adjustment about the driving-roller 117 as a center and on which roller they are mounted.

The adjustment of the frame for the guide-tapes has already been described. That for the transfer-tapes is illustrated herein as controlled by means of links 143, pivotally secured to the side pieces 130 of the frame for the transfer-tapes, said links being shown as adjustably secured to the main frames 2 and 2′ by clamp-screws 144, set in these frames and working through slots in the links.

As a means for controlling the point at which the severed sheets or wrappers are engaged by the transfer-tapes the adjustable guide-rolls 132 and 136 are shown herein as having not only an adjustment by means of an adjustable link connection with the frame-pieces 130, but are also illustrated as adapted to have a greater range of movement by the engagement of their respective clamping-bolts in the several bolt-holes 132″ and 136″. By advancing these rollers 132 and 136 nearer to or moving them farther from the cutter-blades it will be seen that any length of sheet or wrapper within the limits of the machine may be engaged at its forward end at the proper point as it is being severed by the cutters.

The paper-flier or delivery-frame is shown herein as adjustably mounted on the frame of the sheet-transfer mechanism and adjacent to the discharge-point of the transfer-

tapes. In the form herein illustrated the paper-flier has a pair of side frames or arms 145, adjustably mounted by means of bolts 145′, working in slots 145″ of the side frames 130, provided with bearings at their opposite ends, one set of which rotatively carry a driving-roller 146 and the other pair of which carry a driven roller or follower 147, Fig. 4. These rollers are also shown as connected by a set of tapes 148. In the present case the roller 146 is shown herein as carrying a ratchet-wheel 146′, operated by a pawl 149. This pawl is illustrated as carried by a crank 150, secured to the shaft 135, whereby upon successive rotations of said shaft the ratchet-wheel 146′ is rotated step by step and the sheets of paper are fed gradually forward in the form of a slanting pile as they are delivered to the tapes of the flier by the transfer-tapes, it being understood that the tapes 148 will travel at a very much slower speed than the transfer-tapes.

As it is desirable to modify at times the rate of movement of the traveling tapes of the paper-flier the crank 150, which, of course, has its center out of line with the center of the shaft 135, supports the pawl 149 at a point out of line with its own center, so that when the crank 150 is turned relatively to the shaft for adjustment the center of movement of said pawl will be carried nearer to or farther away from the axis of the shaft 135, (see Fig. 3,) so that a greater or less number of the teeth of the ratchet-wheel may be engaged on each actuation of the pawl, as may be desired, it being understood that the crank will be held in its adjusted position in any suitable manner.

The shaft 135 is shown herein as carrying a grooved pulley 135′, actuated from a corresponding pulley 151, carried by the shaft 117, a belt 152 being shown as connecting these pulleys. The shaft 117 receives power, as before stated, from the main driving-shaft through a belt connecting the band-wheel 122 with the band-wheel 123. As the band-wheel 122 is of relatively great diameter as compared with the diameter of the band-wheel 123 the shaft 117 will be driven with the required relatively slow speed with respect to the rotation of the cutter-shaft 100.

In some cases it may be found desirable to rewind the printed web of paper after it passes the feed-rolls instead of cutting the web into separate sheets. For the purpose of effecting the rewinding of the traveling web a winding-roller is shown at 153 as supported for rotation in bearings carried by a bracket 154, secured to the rear of the main frame. When the shaft 117 is not operated, the belt connecting the same with the band-wheel 123 will be changed in position for the purpose of operating the roller 153, said roller being disposed at a proper distance from the band-wheel 123 to permit this, and said belt being driven so as to slip slightly and thereby compensate for the increase in the size of the paper-roll as the web is rewound upon the roller 153, the printing-strip 14 being also rewound upon its winding-drum in a similar manner, as hereinbefore described. The cutter mechanism and the sheet-delivery mechanism should then, of course, be disconnected, so as to be thrown out of operation.

The operation of a machine constructed in accordance with my invention, as hereinbefore set forth, will be apparent.

As the web of paper is fed from the roll R into the machine it passes over and around the guide-roll 82 and the take-up roll 94, thence over the platen P, thence around the take-up roll, and thence passes out between the feed-rolls 67 and 68, the movement of the paper at the roll R and the feed-rollers, respectively, being maintained constant by the connection of the feed-rolls with the main driving-shaft and by the stress exerted upon the paper-roll carrier by the retarding means or friction-clamp. As the take-up rolls move back and forth in unison with the impression movement the advance of the portion of the web between said rolls will be alternately retarded and accelerated as the platen P moves toward or from the impression-cylinder I. The form or printing strip is carried around this impression-cylinder at a constant and relatively slow rate of speed, and during its passage around such cylinder is inked by the composition inking-rollers 51′, 52′, and 53′, which revolve at a uniform peripheral speed. At the moment of impression the take-up rolls are moving to the right, as seen in Fig. 5, at their maximum rate of movement in this direction. As the impression is produced the two impression members—viz., the platen P and the cylinder I—are locked against slipping by the engagement of the tooth 96 between corresponding teeth of the gear-wheel 10′. As soon as the impression is produced the platen withdraws from the cylinder I and the take-up rolls begin to move toward the left, as seen in Fig. 5, the eccentrics 84 gradually multiplying the elliptical orbital movement to the right of the lower ends of the rock-arms 83 during the corresponding movement of the platen to the left in its elliptical orbit, and hence the take-up rolls are correspondingly actuated toward the left until the platen is at its maximum distance from the cylinder I, when said take-up rolls will be moving to the left at their maximum speed. By this means the necessary speeding up of the portion of the web between the take-up rolls to a rate very much above the constant rate of movement maintained at the feed-rolls and the paper-rolls is obtained, it being understood that the amount of acceleration of the movement of the web will be equal to the amount of retardation of the same. As the rate of movement of the cylinder I and the ink-rolls is constant and as the advance of the web, although variable, carries the paper forward at a relatively high speed as compared with the

movement of the printing strip or form impressions may be produced upon the moving web at predetermined distances apart, after which the paper will be carried through the feed-rolls and the printing-strip will be cleaned by the wiping mechanism and rewound upon the reel or drum 19, which may then be removed from the shaft and laid aside.

As the printed web passes between the feed-rolls its momentum carries it down until the forward edge thereof has passed the guide-plate 97 and the guide-tapes 124 and the forward edge of the moving sheet is about to be engaged between the transfer-tapes when the rotating shear severs the web, and the sheet so severed is carried down and delivered upon the paper-flier. As the rate of advance of these traveling tapes of the sheet-transfer mechanism is considerably slower than that of the paper-web each sheet as it is severed by the cutters is retarded in its movement, so that it forms a guide for the forward end of the next succeeding sheet, and hence the successive sheets between the cutters and the flier will be carried in the form of a continuous band of overlapping members, each one of which serves to guide and support the next succeeding sheet. As the sheets pass out through the transfer-tapes and are delivered onto the flier the relatively slow movement of the tapes of the latter arrange the sheets, in the manner well known in the art, in a slanting pile convenient for handling.

My improved machine is especially adapted and intended for operation at a high rate of speed, its normal capacity being about five hundred wrappers or sheets per minute.

It is obvious that in a machine operating at such a speed all of the coöperating mechanisms must be properly connected and timed in their movements, so that the several operations of impressing the paper, retarding and accelerating the movements of the same, severing the sheets or wrappers from the web, and transferring these sheets to the flier will occur in exact sequence and at predetermined intervals. I have found by practical experiment that in order to properly handle wrappers which are printed and cut while the machine is operating at the high rate of speed it is designed to attain peculiarly-effective sheet receiving and transferring mechanism is essential, and also that it is practically impossible to secure good results except by means of devices which can be adjusted to properly compensate for varying conditions of speed and momentum of the sheets as they are cut from the web and for sheets of varying lengths and kinds of material.

Having thus described my invention, I claim—

1. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-form through the machine at a relatively low rate of speed and for presenting successive portions of said form to successive impression portions of the web; of feeding means operative for feeding a web of paper into and away from the machine at the same, and at a relatively high, rate of speed; and speed-modifying mechanism having equal and synchronous web taking-up and giving-up movements controlling opposite ends, respectively, of the impression portion of the web, and operative for slowing down the impression portion of the web during the impression period to the rate of advance of the printing-form, and while said impression portion is continuously advancing between the impression members.

2. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-form through the machine at a relatively low rate of speed and for presenting successive portions of said form to successive impression portions of the web; of feeding means operative for feeding a web of paper into and away from the machine at the same, and at a relatively high, rate of speed; take-up members controlling opposite ends, respectively, of the impression portion of the web; a driving-eccentric; and connections between said eccentric and said take-up members for imparting equal and synchronous web taking-up and giving-up movements to said take-up members, and for slowing down the impression portion of the web during the impression period to the rate of advance of the printing-form, and while the impression portion of the web is continuously advancing between the impression members.

3. In a printing-machine, the combination with two impression members; feed-rolls adapted to feed a web of paper between said impression members; take-up members for controlling the movements of the impression portion of the web, and operative in unison; adjustable levers carrying said take-up members; a driving-eccentric; and connections between said eccentric and said levers for actuating said take-up members, substantially as specified.

4. In a printing-machine, the combination with the framework having vertical guides; of two impression members; feed-rolls adapted to feed a web of paper between said impression members; take-up members for controlling the movements of the impression portion of the web between the paper-roll and the feed-rolls, and operative in unison; levers carrying said take-up members; carriers for said levers, and adjustably connected therewith; means for adjusting the carriers in vertical direction in said guides; a driving-eccentric; and connections between said eccentric and levers for actuating said take-up members, substantially as specified.

5. In a printing-machine, the combination with the framework; of two impression members; feed-rolls adapted to feed a web of paper between said impression members; take-up members for controlling the movements of the impression portion of the web between

the paper-roll and the feed-rolls, and operative in unison; levers carrying said take-up members; a driving-eccentric; an arm mounted on said eccentric; connecting-rods connecting said arm and said levers; and a guide connection between said arm and the framework for controlling the movements of said arm, substantially as described.

6. In a printing-machine, the combination with the framework; of a main driving-shaft; an eccentric carried by said driving-shaft; a pair of impression members having one of said impression members operative from said eccentric; feed-rolls operative in unison with the driving-shaft, and adapted to feed a web of paper between said impression members; take-up members operative in unison for modifying the movements of the impression portion of the web; and connections between said take-up members and the eccentric for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

7. In a printing-machine, the combination with the framework; of a main driving-shaft; eccentrics carried by said driving-shaft; arms mounted on said eccentrics; a pair of impression members having equal movements during the impression period, and having one of said members secured to said arms above the shaft for movement with said arms; feed-rolls operative in unison with the driving-shaft, and adapted to feed a web of paper between said impression members; take-up members operative in unison for modifying the movements of the impression portion of the web; levers carrying said take-up members; connecting-rods connecting said levers with the lower ends of the arms carried by the eccentrics, and operative for bringing the impression portion of the web to rest relatively to the impression members during the impression period; and guide connections between the upper ends of the arms and the framework for controlling the movements of said arms, substantially as specified.

8. In a printing-machine, the combination with the framework; of a main driving-shaft; eccentrics carried by said driving-shaft; arms mounted on said eccentrics; a pair of impression members having equal movements during the impression period, and having one of said members secured to said arms above the shaft for oscillatory reciprocatory movement with said arms, and having the other of said members mounted for rotation adjacent to said oscillatory reciprocatory impression member; feed-rolls operative in unison with the driving-shaft, and adapted to feed a web of paper between said impression members; take-up members operative in unison for modifying the movements of the impression portion of the web; levers carrying said take-up members; connecting-rods connecting said levers with the lower ends of the arms carried by the eccentrics, and operative for bringing the impression portion of the web to rest relatively to the impression members during the impression period; and guide connections between the upper ends of the arms and the framework for controlling the movements of said arms, substantially as specified.

9. In a wiping mechanism, the combination with a continuously-advancing member to be wiped; of a plurality of wiping members simultaneously movable in the same direction as the first-mentioned member, the alternating wiping members having, respectively, faster and slower advancing movements than the member to be wiped, whereby said wiping members are adapted to wipe in alternately opposite directions, substantially as specified.

10. In a wiping mechanism, the combination with a continuously-advancing member to be wiped; of a plurality of wiping-rollers simultaneously rotative in the direction of movement of the first-mentioned member, the alternating wiping-rollers having, respectively, faster and slower peripheral movements than the movement of the member to be wiped, whereby said wiping-rollers are adapted to wipe in alternately opposite directions, substantially as specified.

11. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine; of a pressure-roll cooperating with said rotatable impression member for maintaining said printing-strip in contact with the rotatable impression member; feed-rolls adapted to feed a web of paper between said impression members; and take-up members for controlling the movement of the impression portion of the web, and having equal and synchronous web taking-up and giving-up movements for slowing down the impression portion of the web during the impression period to the rate of advance of the printing-strip, and while said impression portion is continuously passing between the impression members, substantially as specified.

12. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine; of a pressure-roll cooperating with said rotatable impression member for maintaining said printing-strip in contact with the rotatable impression member; a paper-roll carrier adapted to support a paper-roll; feed-rolls adapted to feed a web of paper between said impression members from said paper-roll; retarding means for preventing racing of the paper-roll; and take-up members for controlling the movement of the impression portion of the web, and having equal and synchronous web taking-up and giving-up movements for slowing down said impression portion of the web during the impression period to the rate of advance of the printing-strip, and while

said impression portion is continuously passing between the impression members, substantially as specified.

13. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing through the machine a printing-strip having relief-characters thereon, and for presenting successive portions of said strip to successive impression portions of the web; of a pressure-roll having a yielding peripheral surface, and in position and adapted for engaging said printing-strip and holding the same in contact with the rotatable impression member, whereby said strip is fed between said impression member and the pressure-roll without injuring the relief-characters on said strip; feeding means adapted to feed a web of paper between the impression members; a web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

14. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing through the machine a printing-slip having relief-characters thereon, and for presenting successive portions of said strip to successive impression portions of the web; of a pressure-roll cooperative with the rotatable impression member, and having a yielding peripheral surface; a pressure-roll carrier; a support for said carrier; an adjustable resilient connection between said support and carrier, whereby the pressure of said roll upon the rotatable impression member is varied; feeding means adapted to feed a web of paper between said impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

15. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing through the machine a printing-strip having relief-characters thereon, and for presenting successive portions of said strip to successive portions of the web; of a pressure-roll having a yielding peripheral surface; a pressure-roll carrier; a fixed rod supporting said carrier for oscillation; a torsion-spring mounted on said rod and secured to said carrier and adjustably connecting said rod and carrier, whereby the pressure of the roll upon the rotatable impression member is varied; feeding means adapted to feed a web of paper between the impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

16. In a printing-machine, the combination with two impression members, one of which has a circuit of peripheral indentations and is rotatable for advancing through the machine a printing-strip having relief-characters upon one side thereof, and a series of projections on the other side thereof complementary to the indentations of said impression member; of a pressure-roll having a yielding peripheral surface, and in position and adapted for engaging said printing-strip and holding the same in contact with the rotatable impression member, whereby said strip is fed between the rotatable impression member and the pressure-roll without injuring the relief-characters on said strip; feeding means adapted to feed a web of paper between said impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

17. In a printing-machine, the combination with web-feeding mechanism for carrying a web of paper into and away from the machine at a rapid rate of speed; and with cutter mechanism for severing the web into sheets at predetermined points in the movement of the web as it emerges from the machine; of a sheet-delivery mechanism below said cutter mechanism, and embodying a sheet-transfer mechanism radially adjustable to carry its receiving end nearer to or farther away from the cutter mechanism, and operable for carrying the severed sheets at a slower speed than the speed at which the web is fed by the feeding mechanism; and a sheet-flier in position and adapted for receiving the sheets from the sheet-transfer mechanism, and operable at a slower rate of speed than said sheet-transfer mechanism, substantially as specified.

18. In a printing-machine, the combination with web-feeding mechanism for carrying a web of paper into and away from the machine at a rapid rate of speed; and with cutter mechanism for severing the web into sheets at predetermined points in the movement of the web as it emerges from the machine; of a sheet-delivery mechanism below said cutter mechanism, and radially adjustable to carry its sheet-guide nearer to, or farther away from, the cutter mechanism, and embodying a sheet-guide and a sheet-transfer mechanism radially adjustable relatively to each other, substantially as specified.

19. In a printing-machine, the combination with web-feeding mechanism for carrying a web of paper into and away from the machine at a rapid rate of speed; and with cutter mechanism for severing the web into sheets at predetermined points in the movement of the web as it emerges from the machine; of a sheet-delivery mechanism below said cutter mechanism, and radially adjustable to carry its sheet-guide nearer to, or farther away from, the cutter mechanism, and embodying a sheet-guide and a sheet-transfer mechanism radially adjustable relatively to each other, and said sheet-guide and sheet-transfer mechan-

ism having endless traveling carriers for receiving the sheets as they are cut from the web, substantially as specified.

20. In a printing-machine, the combination with web-feeding mechanism; and with cutter mechanism for severing the web into sheets at predetermined points in the movement of the web; of an adjustable sheet-delivery mechanism below said cutter mechanism, and embodying a pair of frames radially adjustable relatively to each other, the upper of said frames having endless carriers for guiding the sheets as they are severed from the web, and the lower of said frames having two sets of endless traveling carriers for receiving the sheets from the upper carriers, and adjustable rollers carried by the lower frame and carrying the endless carriers thereof, and adapted for varying the positions of the carriers longitudinally and transversely of the lower frame, whereby the point of engagement of the sheets by the carriers and the path of movement of the sheets, are varied, substantially as specified.

21. In a printing-machine, the combination with web-feeding mechanism for carrying a web of paper into and away from the machine at a rapid rate of speed; and with cutter mechanism for severing the web into sheets at predetermined points in the movement of the web as it emerges from the machine; of a sheet-delivery mechanism below said cutter mechanism, and adjustable to carry its sheet-guide nearer to, or farther away from, the cutter mechanism, and embodying a sheet-guide and a sheet-transfer mechanism radially adjustable relatively to each other, and a sheet-flier radially adjustable relatively to, and adjacent to the delivery end of, the sheet-transfer mechanism, and said sheet-guide and sheet-transfer mechanism and sheet-flier having endless traveling carriers for successively receiving the sheets as they are cut from the web, substantially as specified.

22. In a printing-machine, the combination with web-feeding mechanism; and with cutter mechanism for severing the web into sheets at predetermined points in the movement of the web; of an adjustable sheet-delivery mechanism below said cutter mechanism, and embodying a sheet-guide and sheet-transfer mechanism radially adjustable relatively to each other; and said sheet-guide and sheet-transfer mechanism having endless traveling carriers for receiving the sheets as they are cut from the web; and said sheet-delivery mechanism also embodying a sheet-flier carried at the delivery end of, and radially adjustable relatively to, the sheet-transfer mechanism; and said sheet-flier having a driving-roll, means for actuating the endless carriers of the sheet-guide and the sheet-transfer mechanism at one rate of speed, a ratchet-wheel carried by the driving-roll of the sheet-flier, a pawl for actuating said ratchet-wheel at a slower peripheral velocity than the rate of movement of the endless carriers of the sheet-guide and the sheet-transfer mechanism, and endless carriers actuated by the driving-roll of the sheet-flier, substantially as specified.

23. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine, and for presenting successive portions of said strip to successive impression portions of the web; of inking mechanism for inking said form; feed-rolls adapted to feed a web of paper between said impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

24. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine and for presenting successive portions of said strip to successive impression portions of the web, and the other of which is movable into and out of engagement with said rotatable impression member; of inking mechanism for inking said strip; feed-rolls adapted to feed a web of paper between said impression members; and web-take-up mechanism coöperative with the second impression member, and having equal and synchronous web taking-up and giving-up movements controlling opposite ends, respectively, of the impression portion of the web, and operative for slowing down the impression portion of the web during the impression period to the rate of advance of the printing-strip and while said impression portion is continuously advancing between the impression members, substantially as specified.

25. In a printing-machine, the combination with the framework; of a main driving-shaft; an eccentric carried by said shaft; a pair of impression members, one of which is rotatable for advancing the printing-strip through the machine and for presenting successive portions of said strip to successive impression portions of the web, and the other of which is operative from said eccentric; inking mechanism for inking said strip; feed-rolls operative by the driving-shaft, and adapted to feed a web of paper between said impression members; take-up members operative in unison for modifying the movements of the impression portion of the web; and connections between said take-up members and the eccentric for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

26. In a printing-machine, the combination with the framework; of a main driving-shaft; an eccentric carried by said driving-shaft; a pair of impression members, one of which is rotatable for advancing a printing-strip through the machine and for presenting successive portions of said strip to successive

impression portions of the web, and the other of which is operative from said eccentric; inking mechanism for inking said strip; feed-rolls operative by the driving-shaft, and adapted to feed a web of paper between said impression members and into and away from the machine at the same, and at a relatively high, rate of speed; take-up members operative in unison for modifying the movements of the impression portion of the web; and connections between said take-up members and the eccentric for imparting to said take-up members equal and synchronous web taking-up and giving-up movements controlling opposite ends of, and acting in a direction opposite to the direction of movement of, the impression portion of the web, for slowing down the impression portion of the web during the impression period to the rate of advance of the printing-strip, and while said impression portion is continuously advancing between the impression members, substantially as specified.

27. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine and for presenting successive portions of said strip to successive portions of the web, and the other of which is movable into and out of operative relation with the first, and has a progressive advancing movement during the impression period equal to the rate of advance of the printing-strip; of feeding means operative for feeding a web of paper between said impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

28. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine, and for presenting successive portions of said strip to successive portions of the web; of inking mechanism for inking said strip; wiping mechanism for wiping said strip as it emerges from between the impression members; feed-rolls adapted to feed a web of paper between said impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

29. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine, and for presenting successive portions of said strip to successive impression portions of the web; of inking mechanism for inking said strip; wiping mechanism for wiping said strip as it emerges from between the impression members; feed-rolls adapted to feed a web of paper between said impression members; web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period; cutter mechanism for severing the web into sheets at predetermined points in the movement of the web after each impression; and sheet-delivery mechanism embodying successive sets of endless carriers having successively slower rates of advancing movement than the rate of feed of the web by the feed-rolls, substantially as specified.

30. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-form through the machine, and for presenting successive portions of said form to successive impression portions of the web; of inking mechanism for inking said form; wiping mechanism for wiping said form as it emerges from between the impression members; feed-rolls adapted to feed a web of paper between said impression members; take-up members for controlling the movement of the impression portion of the web, and having equal and synchronous web taking-up and giving-up movements controlling opposite ends, respectively, of the impression portion of the web, and operative for slowing down the impression portion during the impression period to the rate of advance of the printing-form and while said impression portion is continuously advancing between the impression members; cutter mechanism for severing the web into sheets at predetermined points in the movement of the web after each impression; and sheet-delivery mechanism operable for receiving said sheets and forming them into a pile, substantially as specified.

31. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine and for presenting successive portions of said strip to successive impression portions of the web, and the other of which has a movement into and out of engagement with the first; of inking mechanism for inking said strip; feed-rolls adapted to feed a web of paper between said impression members; web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period and while the printing-strip is continuously advancing through the machine; and locking means operative in unison with said respective impression members, and in position and adapted for engagement during the impression period, to thereby lock said impression members against shifting movement relatively to each other during said period, and thus prevent unequal advancing movements of the printing-strip and the impression portion of the web at the printing movement, substantially as specified.

32. In a printing-machine, the combination with the framework; of a main driving-shaft; a driven shaft operated from said driving-shaft; an impression member rotatable with

said driven shaft; a driving-eccentric carried by the driven shaft; a crank-arm mounted on said eccentric; a second impression member carried by said crank-arm; feed-rolls adapted to feed a web of paper between said impression members; take-up members controlling the movements of the impression portion of the web between the paper-roll and the feed-rolls, and operative in unison; levers carrying said take-up members; connecting-rods connecting said crank-arm and levers; a guide connection between said crank-arm and the framework for controlling the movements of the crank-arm; locking means carried by the driven shaft; and coöperative locking means movable with the crank-arm, and in position and adapted for engaging the locking means of the driven shaft during the impression period, to thereby prevent shifting movement of the impression members relatively to each other during said period, substantially as specified.

33. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine and for presenting successive portions of said strip to successive impression portions of the web; of inking mechanism for inking said strip; wiping mechanism for wiping said strip, as it emerges from between the impression members; rewinding mechanism for rewinding the strip and for advancing the same through the machine; feed-rolls adapted to feed a web of paper between said impression members; web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period; cutter mechanism for severing the web into sheets at predetermined points in the movement of the web after each impression; and sheet-delivery mechanism embodying a sheet-guide mechanism; a sheet-transfer mechanism having endless traveling carriers movable at a slower rate of speed than the rate of feed of the web by the feed-rolls, and a paper-flier having endless carriers movable at a slower rate of speed than the endless carriers of the sheet-guide mechanism and the sheet-transfer mechanism, substantially as specified.

34. In a printing-machine, the combination with two impression members, one of which is rotatable for advancing a printing-strip through the machine and for presenting successive portions of said strip to successive portions of the web; of inking mechanism for inking said form, and embodying an inking-roller mounted for rotation in contact with the printing-strip, during the passage of said strip around said impression member, and fixed against movements toward and from said strip; and means for positively rotating the rotatable impression member and the inking-roller in unison; feed-rolls adapted to feed a web of paper between said impression members; and web-take-up mechanism for bringing the impression portion of the web to rest relatively to the impression members during the impression period, substantially as specified.

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