

(No Model.)

3 Sheets—Sheet 1.

H. S. BANTA & E. D. BLACK.  
PRINTING MACHINE.

No. 547,409.

Patented Oct. 8, 1895.

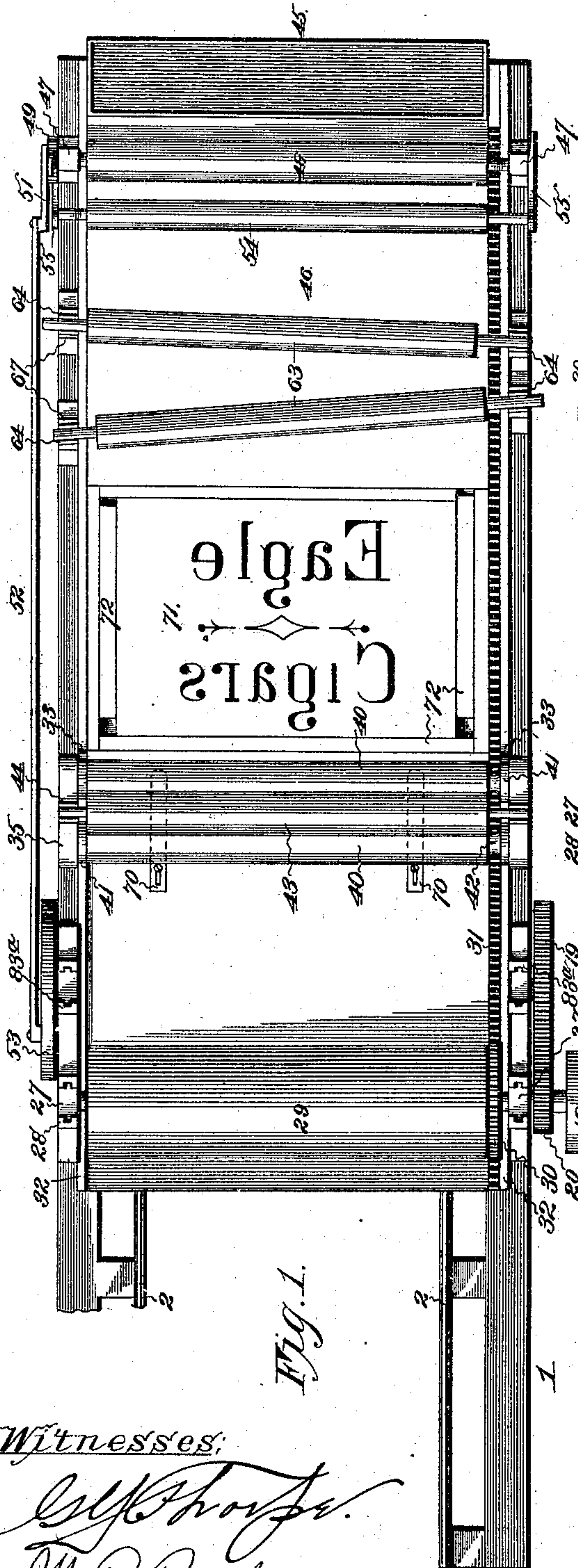


Fig. 1.

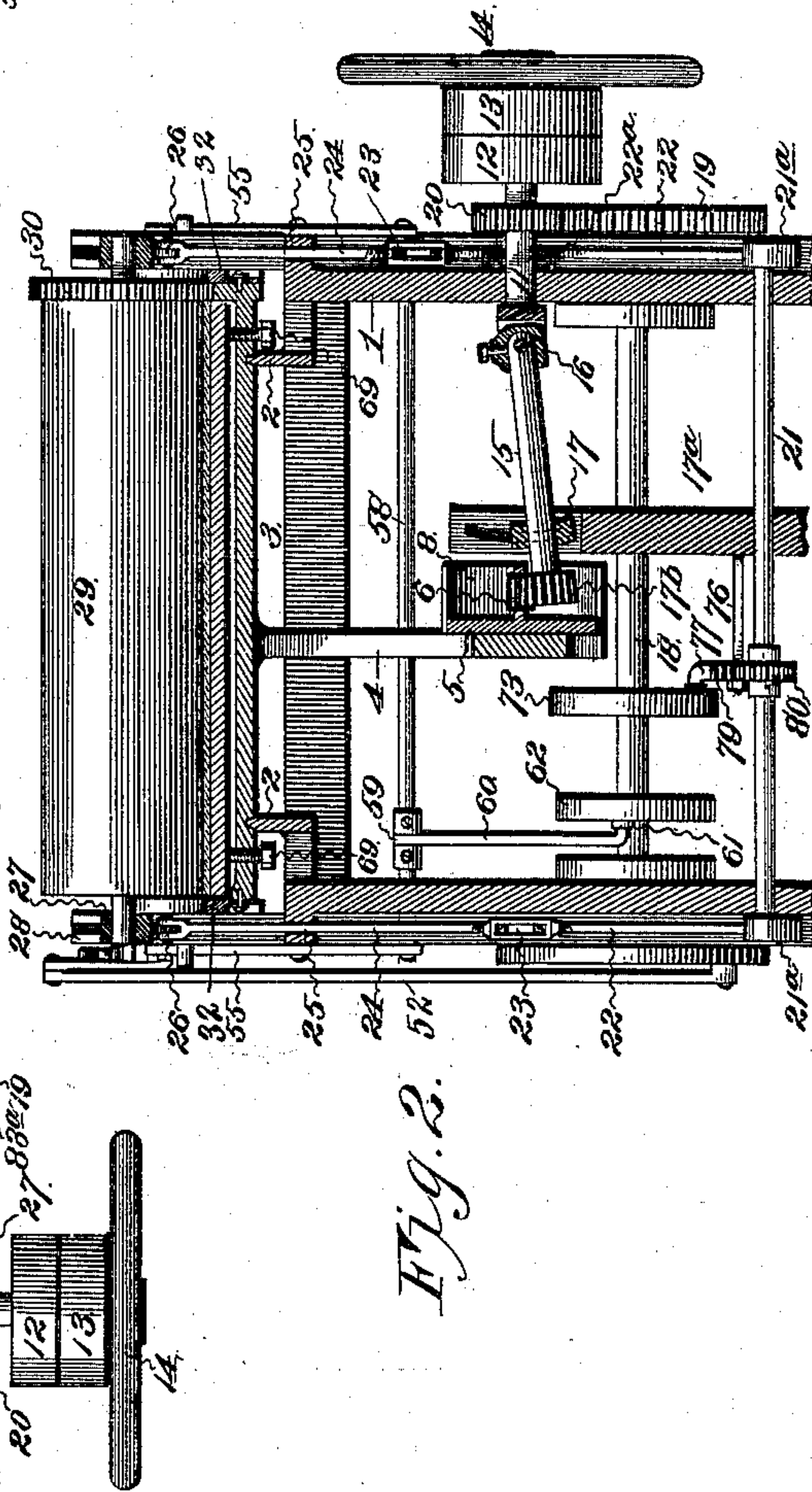


Fig. 2.

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By: *Higdon & Higdon,*  
Attys.

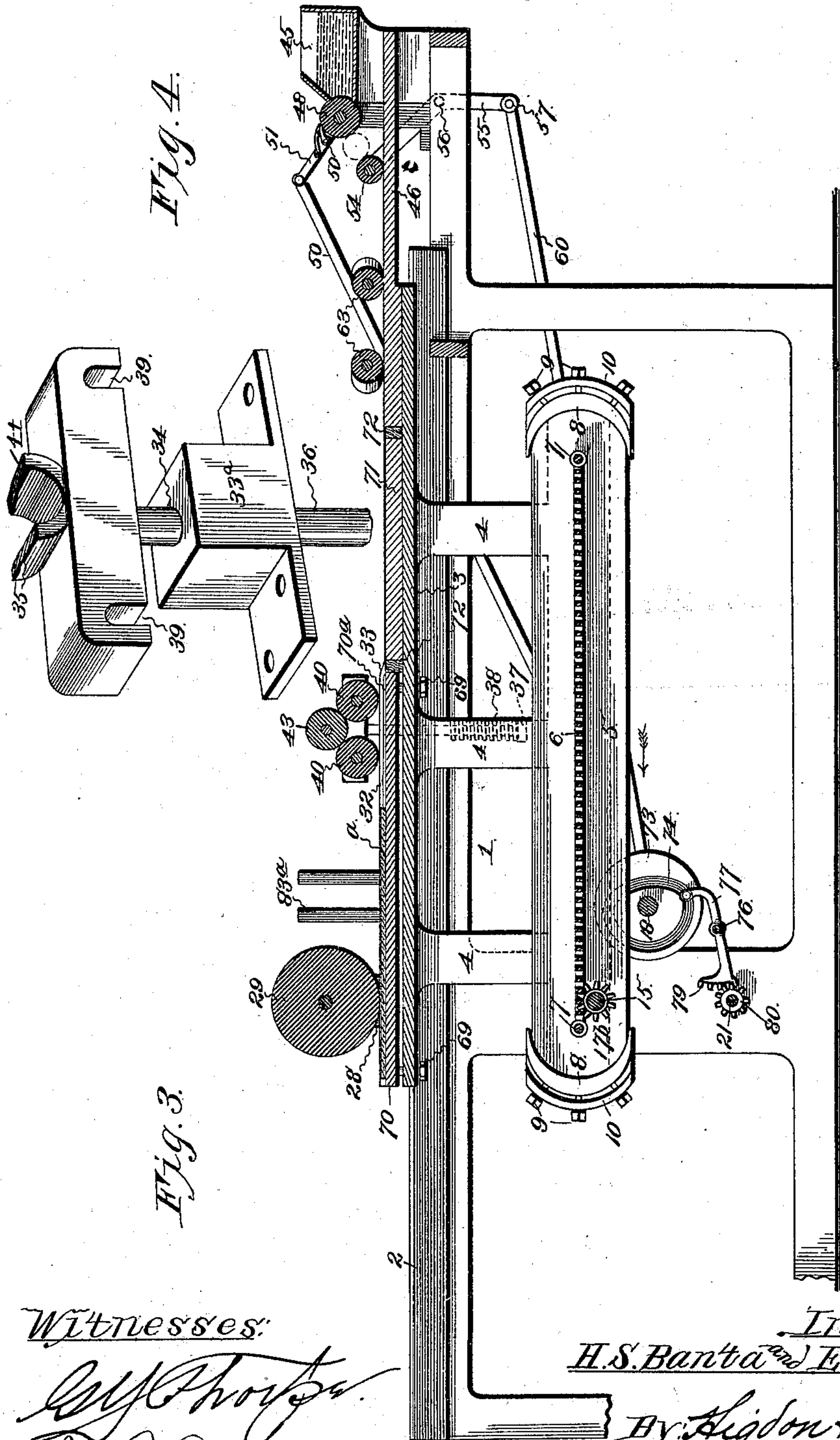
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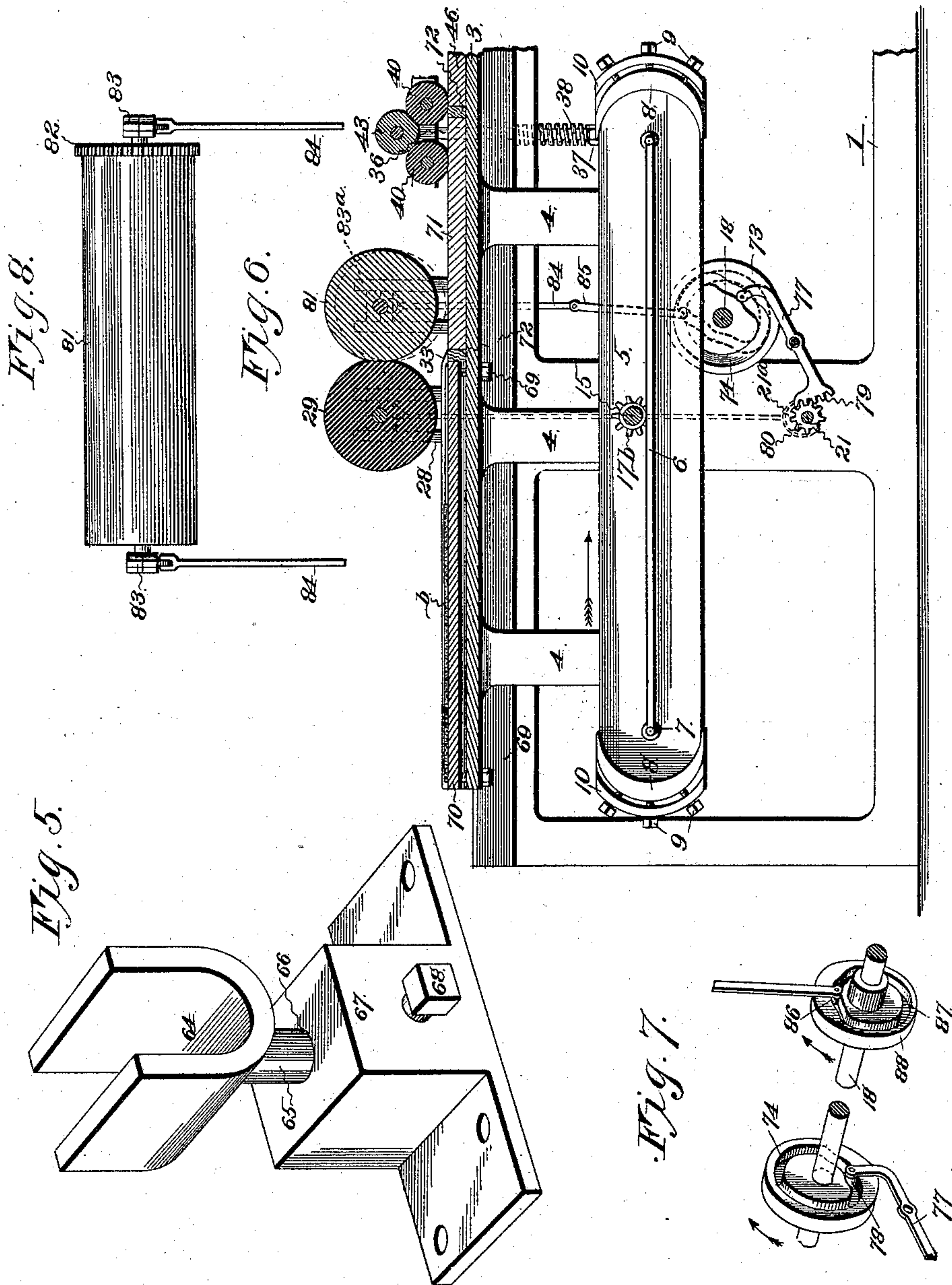
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3 Sheets—Sheet 3.

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PRINTING MACHINE.

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# UNITED STATES PATENT OFFICE.

HARRY S. BANTA AND EDMUND D. BLACK, OF KANSAS CITY, MISSOURI.

## PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 547,409, dated October 8, 1895.

Application filed December 3, 1894. Serial No. 530,634. (No model.)

*To all whom it may concern:*

Be it known that we, HARRY S. BANTA and EDMUND D. BLACK, of Kansas City, Jackson county, Missouri, have invented certain new and useful Improvements in Printing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to printing apparatus, and our object is to provide a construction whereby transparent substances may be printed upon, and whereby yielding and unyielding substances not transparent may be printed upon.

With this object in view the invention consists in certain peculiar and novel features of construction and combinations of parts, as will be hereinafter described and claimed.

In order that the invention may be fully understood, we will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 represents a plan view of our apparatus as arranged for printing upon transparent substances. Fig. 2 is a vertical section of the same on the line of the axis of the transfer or impression roller. Fig. 3 is a vertical longitudinal section of the same to one side of its longitudinal center. Fig. 4 is a detail perspective view of one of the bearings of the form-rollers. Fig. 5 is a detail perspective view of one of the bearings of the distributing-rollers. Fig. 6 is a vertical longitudinal section of a portion of the apparatus, which shows the same arranged to print upon yielding surfaces or unyielding surfaces when the second impression or transfer roller is replaced by a roller of yielding material, as will be hereinafter explained. Fig. 7 is a detail perspective view of a shaft, upon which are mounted in operative position relative to each other the cams for raising and lowering at the proper moments the said impression or transfer rollers; and Fig. 8 is a detail view in elevation of the said second impression or transfer roller, the boxes in which it is journaled, and the rods pivotally carried thereby.

In the said drawings, 1 designates a framework of the construction shown or of any other suitable or preferred construction, and

2 designates a pair of longitudinal and parallel tracks, upon which the traveling table or bed-plate 3 reciprocates. Depending from this table are the vertical arms 4, which are united at their lower ends by a bar which carries the longitudinally-extending plate 5, and cast integral with said plate and projecting horizontally from one side of the same is a rack-bar 6, which is provided at each end with an antifriction-roller 7, and arranged concentric to the axis of the said rollers are the semicircular flanges 8, which project laterally from the ends of the said plate 5. A number of set-screws 9 extend through the curved flanges 10 of the bar against which the plate 6 rests and secure said plate 6 firmly but detachably in position.

Journaled in one of the vertical portions of the framework is the transversely-extending shaft 11, upon the outer end of which is mounted the fast and loose pulleys 12 and 13, respectively, and the fly or balance wheel 14. A second shaft 15 forms a continuation of said shaft 11 and is pivotally connected thereto at one end, as shown at 16, so as to be free to swing in a vertical plane and to rotate therewith simultaneously. Said shaft, near its inner end, is journaled in a boxing 17, which slides in a vertical plane concentric to the pivotal point of said shaft in the grooved standard 17<sup>a</sup>, and mounted upon the inner end of said shaft is a star-wheel 17<sup>b</sup>, which engages first one side and then the other of the rack-bar 6 to cause the reciprocation of the table or bed-plate in a manner to be hereinafter more particularly described.

Extending longitudinally of the machine, parallel with the shaft 11 and journaled at its opposite ends in the framework is a shaft 18, and mounted upon one end of the same is a large cog-wheel 19, which meshes continuously with the small cog-pinion 20 upon the shaft 11. This cog-wheel is of such size relative to the said pinion that it makes one complete revolution to each back-and-forth reciprocation of the table or bed-plate. Arranged in the same vertical plane as and parallel with the shaft 11 and a suitable distance below the same is a shaft 21, which is also journaled in the framework, and mounted upon the opposite ends of the same are the eccentrics 21<sup>a</sup>, which are connected by the rods 22, turn-



buckles 23, and the rods 24, pivotally, as at 26, to the sliding boxes 27, which are provided with outwardly-projecting ribs, which engage the grooves in the vertical standards 28, secured upon and projecting above the said framework. The rods 24 extend through apertures 25 in flanges at the upper side margins of the framework, (see Fig. 2,) and the rod 22 at the side of the machine occupied by the shaft 11 is necessarily bent out of its direct course, as shown by the shade-lines at 22<sup>a</sup>, so that in said reciprocatory movement it will not come in contact with said shaft 11, which, as before explained, is vertically above the shaft 21. The impression or transfer roller 29, of rubber or other suitable yielding material, has its spindle or shaft journaled in the boxes 27, so that its axis is in the same vertical plane as the axes of the shafts 17 and 21, and secured rigidly at one end of said roller is a cog-wheel 30, which meshes at times with the longitudinally-extending rack-bar 31, secured marginally to one side of or formed integral with the table 3. Secured to the outer side of the rack-bar 31 and to the opposite margin of the table 3 are the vertically-adjustable bearers 32, which at a suitable point, as at 33, change the plane of their upper or bearing surfaces for a purpose to be hereinafter explained. Arranged a suitable distance rearward of the impression or transfer roller and bolted or otherwise rigidly secured upon the framework are the boxes 33<sup>a</sup>, provided with vertical apertures 34. Bearings 35 are provided centrally with depending stems 36, which extend through said apertures 34 and also through and a suitable distance below the said marginal flanges of the framework, and mounted spirally upon said stems and bearing at their upper and lower ends against the under side of the framework and the retaining-nuts 37, respectively, are the expansion-springs 38, which tend to force said stems downward all the time. The bearings 35 are provided at opposite sides of their center and in their under side with the bearing slots or grooves 39, in which are rotatably mounted the spindles of the form-rollers 40, which extend transversely of the machine and parallel with the roller 29. At the opposite ends of said rollers, which are of ordinary composition or yielding material, are provided the metallic disks or rollers 41, which are held with a yielding pressure at all times upon the bearers 32 by the springs 38. At a point vertically above the rack 31 the form-rollers are cut away, as shown at 42, so as not to contact with said rack. In order to assist in the proper distribution of ink upon said rollers, we provide the distributing-roller 43, which extends parallel and contacts with the said form-rollers and has its spindles journaled rotatably in the U-shaped bearings 44, formed upon the bearings 35.

At the rear end of the framework is mounted, as shown, or in any other suitable manner, the ink-fountain 45, so that the ink-distrib-

uting plate 46, which is bolted or otherwise rigidly secured to and projecting rearwardly from the bed-plate 3, may reciprocate beneath it, and journaled in bearing-boxes 47, carried by the framework, is the shaft of the supply-roller 48, which communicates with the ink in said fountain. A ratchet-wheel 49 is mounted upon one end of the shaft and is engaged by a spring-actuated pawl 50, carried by a lever 51, mounted loosely upon said shaft, and said lever is pivotally connected by the link-rod 52 with the disk 53 upon the shaft 18 at the corresponding side of the machine. A small transfer-roller 54 extends parallel with the roller 48 and is journaled at its opposite ends in the upper ends of the levers 55, which levers are pivoted, as at 56, a suitable distance above their lower ends to the sides of the framework, and are connected at their lower ends, as at 57, by the cross-rod 58. Said rod is pivoted, as at 59, to a link-rod 60, which carries an antifriction-roller 61 at its opposite end, which engages a cam-groove in the wheel 62, mounted rigidly upon said shaft 18. It will be seen from the foregoing that with each complete revolution of said shaft 18 the supply-roller 48 is rotated and the roller 54 transfers a supply of ink from the same to the ink-distributing plate 46. Extending at different angles across the face of the ink-distributing plate and in contact therewith at all times are the vibratory distributing-rollers 63, and the shafts of said rollers are journaled at their opposite ends in the U-shaped bearings 64, which are provided with cylindrical stems 65, engaging corresponding apertures 66 in the brackets 67, bolted or otherwise rigidly secured upon the framework of the machine, and said U-shaped bearings are held at any desirable point in their adjustment by the set-screws 68, which impinge upon the stems 65 and are carried by said brackets. Extending up through the table or bed-plate are a number of impression-screws 69, which support upon their upper ends the platen 70, upon which the plate or substance to be printed rests, and is held from longitudinal movement by the adjustable plates 70<sup>a</sup> and from lateral movement by the rack-bar 31 and the bearer at the opposite side of the table, or in any other suitable manner. The form 71 is arranged between the ink-distributing plate and said bearing, as shown, by the strips 72, or in any other suitable or preferred manner, and the upper surface or face of said form is adapted to lie in the same horizontal plane as the said distributing-plate 46. Secured rigidly upon the shaft 18 at a suitable point is a wheel 73, provided with a cam-groove 74 in one side. A stub-shaft 76 projects from a standard at 17<sup>a</sup>, or any other suitable point, and mounted pivotally upon the same is the lever 77, which carries an antifriction-roller 78 at one end, engaging the groove 74, and is provided with segmentally-arranged teeth 79 at its opposite end, which engage a pinion 80 upon the shaft 21. The



groove in said cam-wheel 73 is of such configuration that while the table is moving forward in the direction indicated by the arrow, Fig. 3, the said transfer or impression roller 29 is elevated, and while the table is moving in the opposite direction said transfer-roller is depressed or occupies its lowest point of adjustment.

As a recapitulation of the entire description is unnecessary, we will refer minutely to that portion of the operation only wherein the ink is transferred from the form to the impression-roller and from the impression-roller to the plate to be printed upon.

Supposing the form-rollers to have received a supply of ink from the distributing-plate 46, said distributing-plate being supplied from the ink-fountain by the supply-roller 48 and the transfer-roller 54, as hereinbefore explained, and the vibratory distributing-rollers 63, having distributed said supply of ink evenly upon the surface of said plate, the forward movement of the table, caused by the star-wheel 17 engaging the rack 6, permits the form-rollers by reason of the inclined portion 33 of the bearers 32 to roll over the face of and ink the form. The continued movement of the table in the same direction next causes said form to pass beneath and slightly forward of the impression-roller 29. At this time the star-wheel is engaged by the semi-circular flange 8 at the rear end of the rack-carrying plate, and by the momentum acquired is caused to travel up between the said flange and the opposing antifriction-roller 7, which is permitted by the pivotal operation of the shaft 15, and as said rotating star-wheel engages the rear end of the rack at its upper side and starts the table upon its rearward travel the toothed lever 77 is caused by the cam-groove 74 to partially rotate the shaft 21 and pull the impression-roller 29 down to its lowest point of adjustment, where it frictionally engages the form upon the rearwardly-moving table and receives the impression from the same. The continued rearward movement of the table next brings the transparent plate *a* upon the platen beneath and into frictional contact with the said roller, which leaves the impression of the form upon said plate, and as said table reaches its rearward limit of motion the cam-groove 74 raises the roller to its original position simultaneously with the descent of the star-wheel at the opposite end of the rack-bar to engage the under side of the same and again move the table forward. It will be understood that as the printing or matter upon the form is reversed and is transferred to the impression-roller and thence to the transparent plate the impression upon said plate will be reversed, so that to read the form it is necessary to reverse the position of the plate, or, in other words, to read through the glass. It is desirable that this should be so, because when employed as a sign in exposed places the printing or other matter upon the glass is

protected from inclement weather. It will be apparent during the reciprocation of the table that, owing to the raised portion of the bearers upon which rest the disks or rollers 41, the form-rollers 40 never come in contact with the plate to be printed upon, but are held above the same, as shown clearly in Fig. 3. It is also apparent that as the table moves forward said rollers are caused by the springs 38, immediately the higher portion of said bearers have passed beyond, to descend into frictional contact with the form and with the distributing-plate, from which they receive their supply of ink.

In order to print upon unyielding surfaces which are not transparent—such as frosted glass, metals, stone, &c.—it is necessary to employ an additional impression-roller, of composition or other suitable yielding material. At the same time it is necessary to dispose the cam-wheel 73 differently from what it appears in Fig. 3, or possibly it will be best to change the form of the groove 74 slightly. This difference will be observed by reference to Figs. 3, 6, and 7, because in this connection the impression-roller 29 must rise as the table begins its backward movement, and immediately thereafter the second impression-roller must descend, at the same time keeping in frictional contact with each other, so that the backward movement of the table will cause the rotation of said second impression-roller 81 by engagement with the cog-wheel 82 at one end thereof in the same manner that it causes the operation of the impression-roller 29. The shaft of said impression-roller 81 is mounted in the ribbed boxings 83, which are adapted to slide vertically in the grooved standards 83<sup>a</sup>, similar to the standards 28, and preferably formed in a single casting therewith. Said boxings are pivotally connected by the rods 84 with the rods 85, which carry upon their lower ends antifriction-rollers 86, which engage the cam-grooves 87 in the wheels 88, secured upon the shaft 18 near its opposite ends.

By reference to Fig. 7 it will be observed that as the shaft and cams rotate in the direction indicated by the arrows the lever 77 will be pivotally operated to cause the roller 29 to rise and the cam-groove 87 to cause the impression-roller 81 to descend almost simultaneously. Supposing the table to be in the position shown in Fig. 6 and moving in the direction indicated by the arrow, it will be apparent that the cam-groove 87 (shown in dotted lines) is just about to move the impression-roller 81 downward, which has received the impression of the form from the roller 29, which has just been elevated, as will also be noted by the location of the cam-groove 74 and the position of the eccentrics upon the shaft 21. (Shown in dotted lines.) By the time the impression-roller 81 descends the plate of unyielding material *b* upon the platen 70 occupies a position beneath the said roller and receives the impression therefrom.



When it is desired to print upon yielding material, the roller 81 of yielding material is replaced by a roller of the same size of metal. The cams upon the shafts are not disturbed.  
 5 It will be understood that a sheet of yielding material upon the platen 70 passing under the non-yielding roller will receive the impression of the form which has been transferred from the yielding roller 29 to said non-  
 10 yielding roller.

From the above description it will be apparent that we have produced a method and an apparatus for printing upon yielding or unyielding and upon transparent surfaces  
 15 which is positive and reliable in operation and comparatively inexpensive of construction. It will also be apparent that various changes of construction and arrangement may be made without departing from the essential spirit and scope of our invention.  
 20

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a printing machine, the combination  
 25 with a table, having a form and a plate to be printed upon, a form-impression cylinder and a second impression-cylinder in contact therewith, of a rotating power-shaft and intermediate connections between the same and the  
 30 table whereby the latter is reciprocated, and means to cause the form-impression cylinder to descend and take the impression from the form, and then to rise, at the same time delivering said impression to the said second  
 35 cylinder, and means to cause the immediate descent of said second cylinder upon the plate to be printed upon, substantially as set forth.

2. In a printing machine, the combination  
 40 with a suitable framework, a table, having a

form and a plate to be printed upon, a form-impression cylinder extending transversely of and above said table, a second impression cylinder parallel and in contact therewith, and a power-shaft whereby the table is re- 45  
 ciprocated, of a second shaft, cams mounted thereon and intermediate connections between the same and the said impression-cylinders, whereby, after the form-impression cylinder rises the second impression cylinder 50  
 descends, substantially as set forth.

3. In a printing-machine, the combination with a suitable framework, a table carrying an ink-distributing plate, a form, and a plate to be printed upon, bearers also carried 55  
 thereby having a portion of their upper surface above the plane of the other portion, an ink-fountain, a supply-roller communicating therewith, an ink-transferring roller, ink-distributing rollers engaging the ink-distribut- 60  
 ing plate, form-rollers provided with unyielding rollers or disks engaging the said bearers, a form-impression cylinder, and a second impression-cylinder frictionally engaging the same, of a shaft, a disk and cam-wheels 65  
 mounted thereon, operative connections between said disk and the ink-supply roller, and operative connections between the said cam-wheels and said ink-transfer roller and said form-impression rollers, and means to 70  
 reciprocate the table and rotate said shaft, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

HARRY S. BANTA.  
 EDMUND D. BLACK.

Witnesses:

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 G. Y. THORPE.