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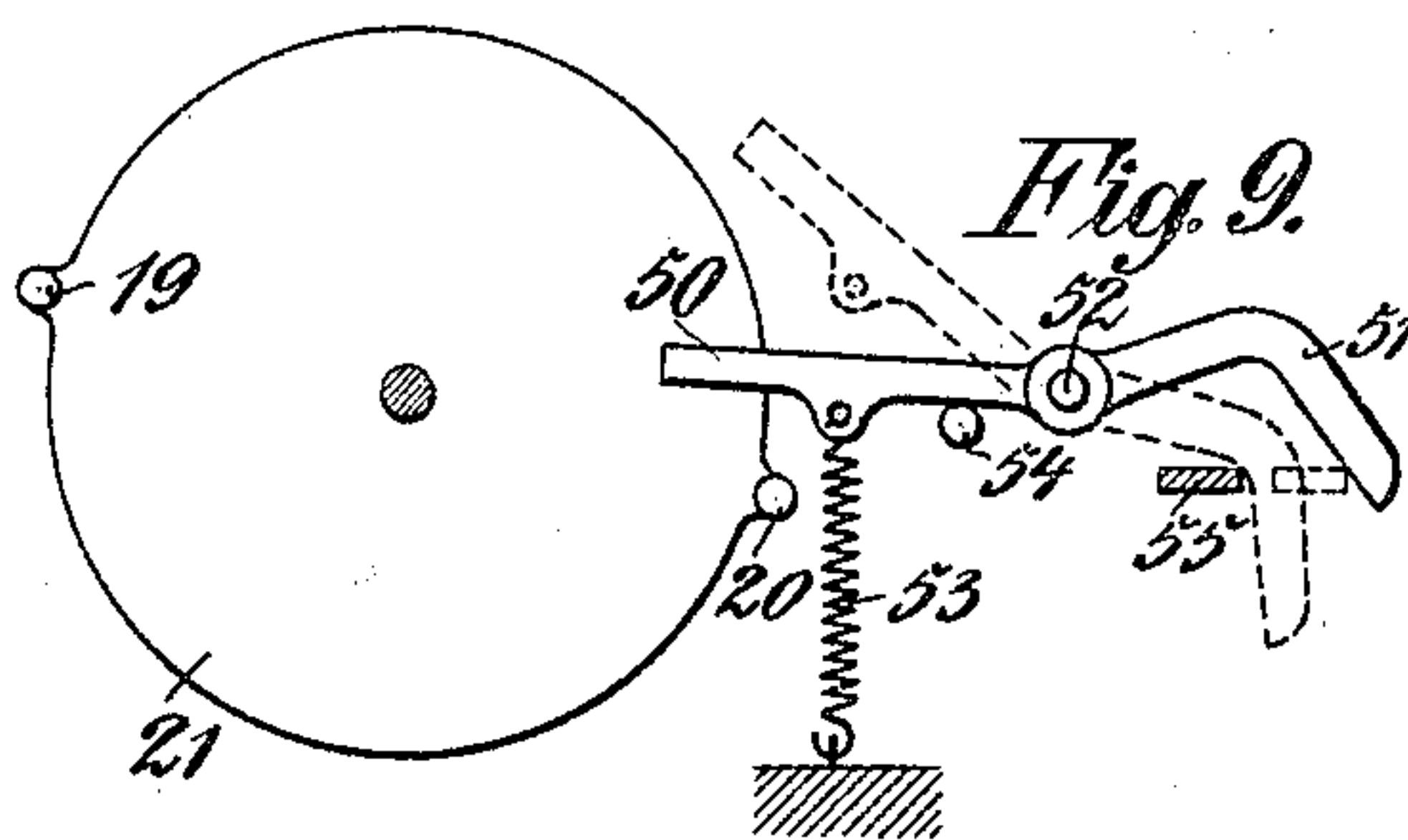
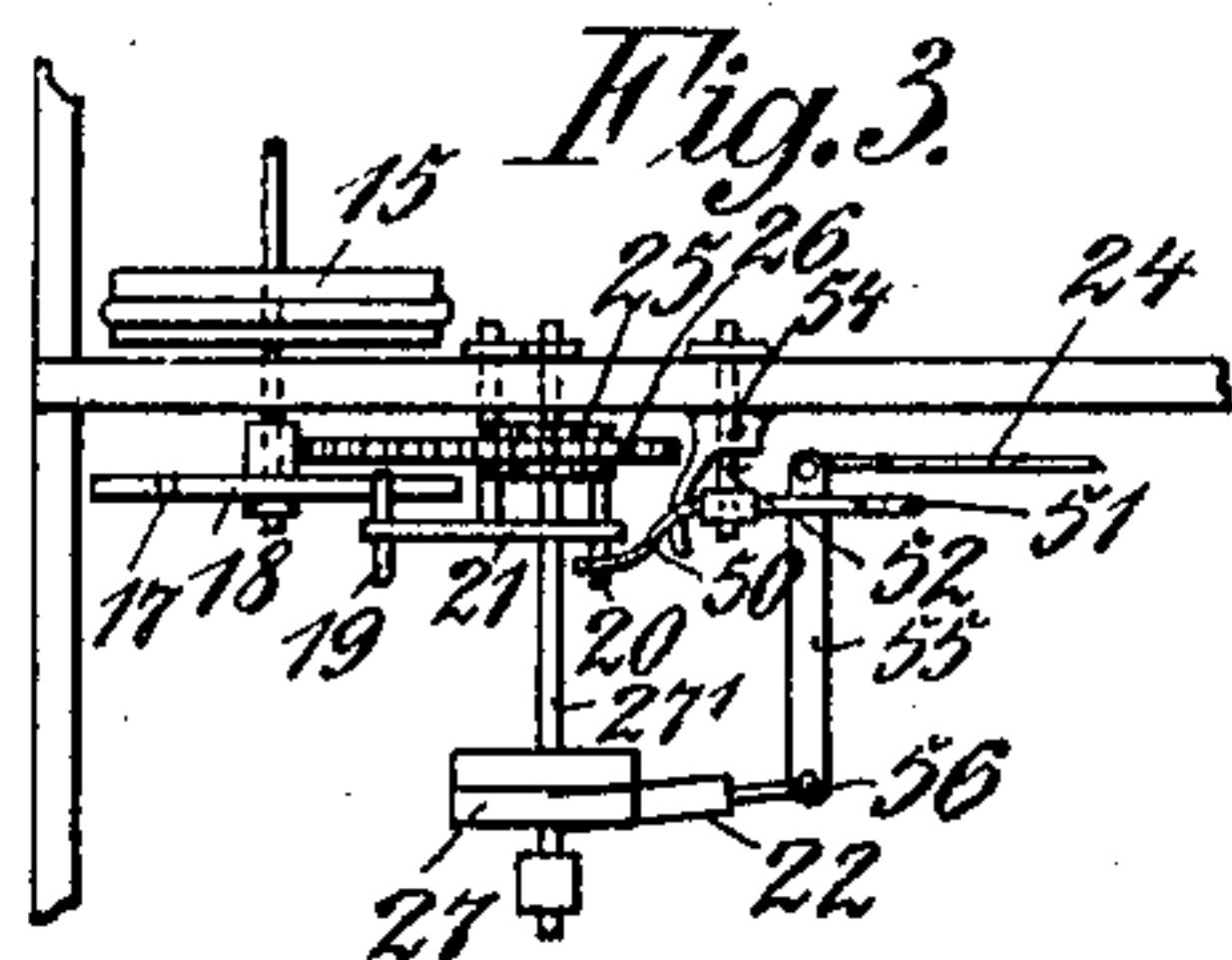
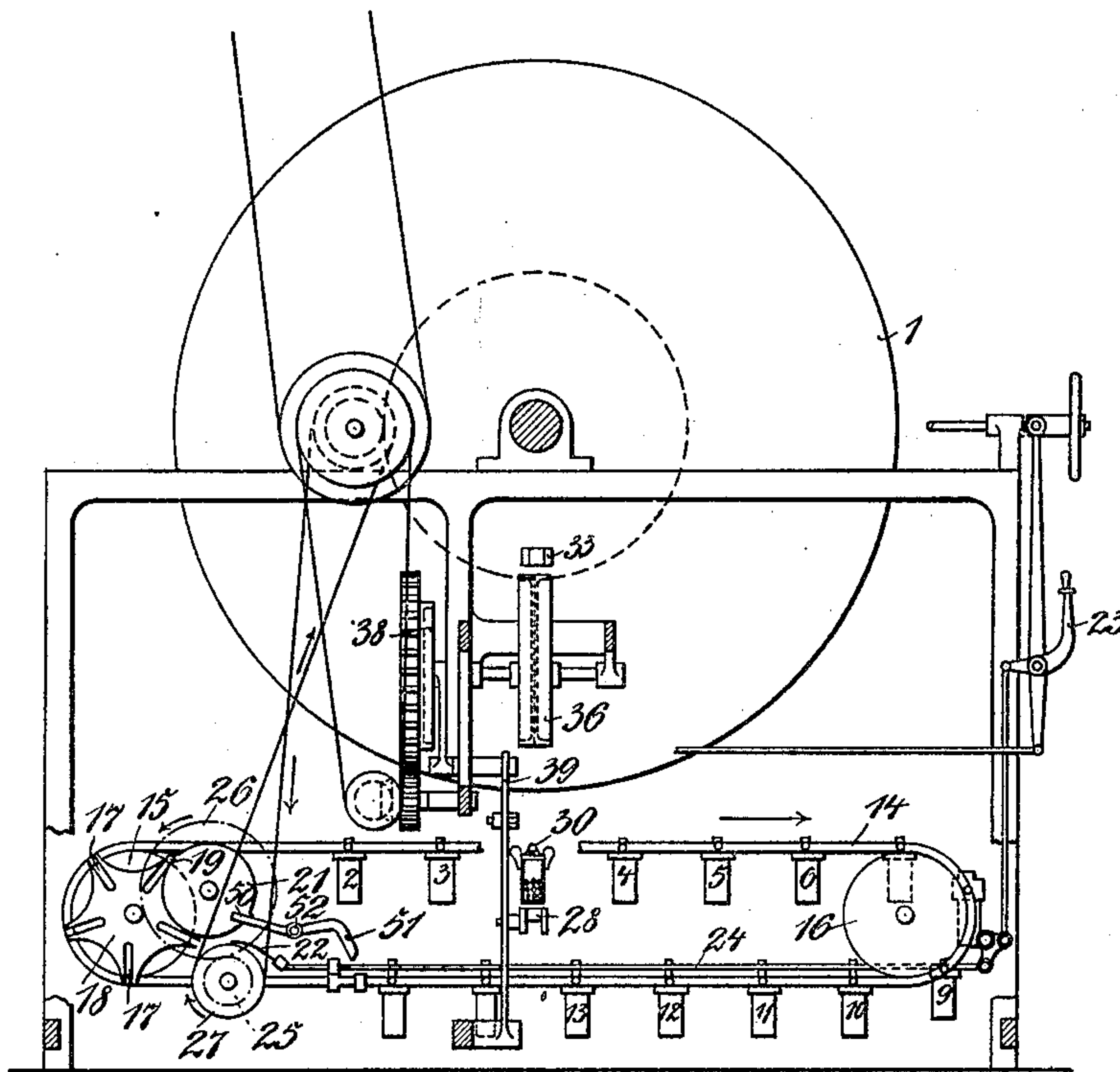
PATENTED JUNE 5, 1906.

F. SCHMIDT.
PRINTING MECHANISM FOR WARP PRINTING DEVICES.

APPLICATION FILED SEPT. 12, 1903.

4 SHEETS—SHEET 1.

Fig. 1.



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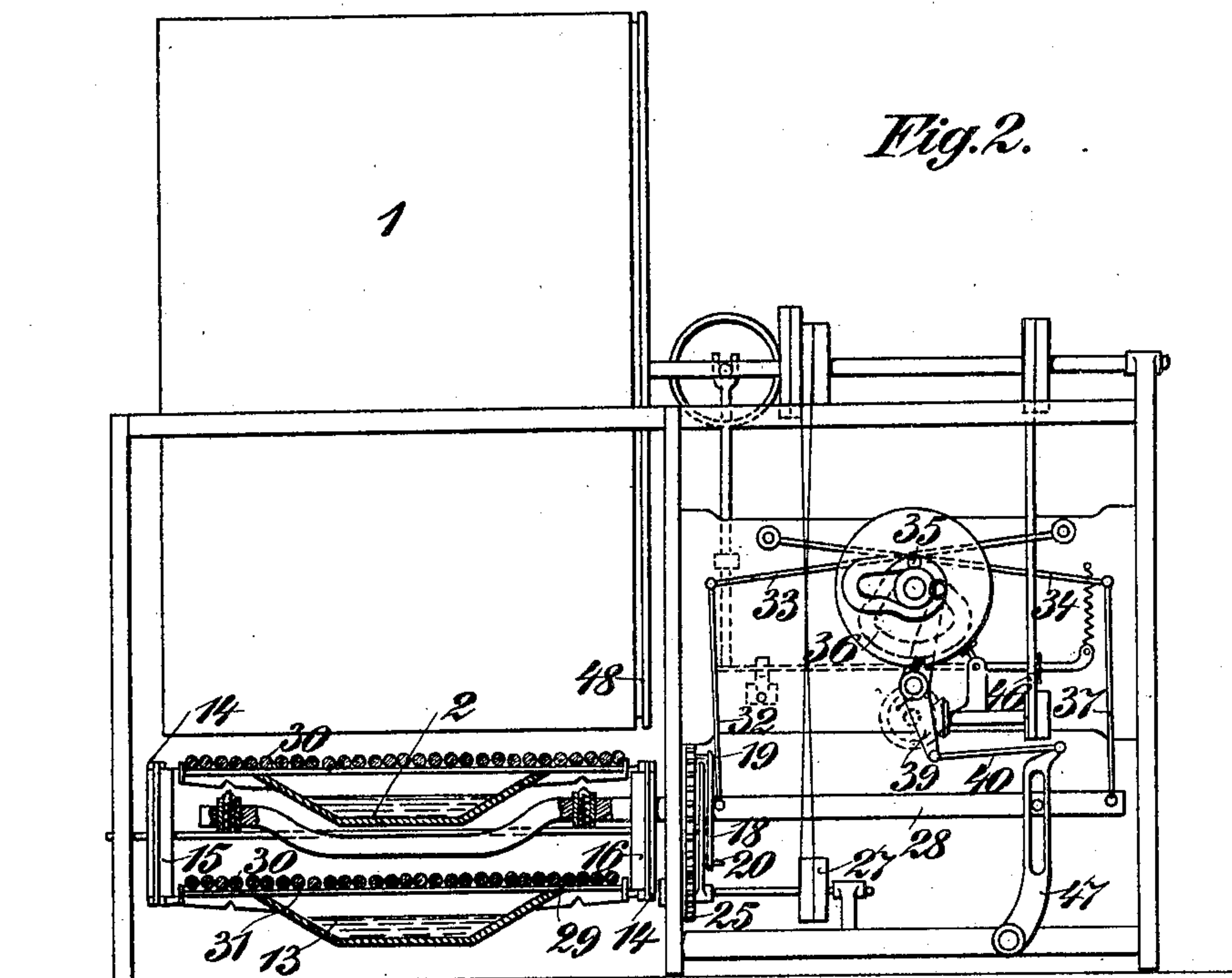
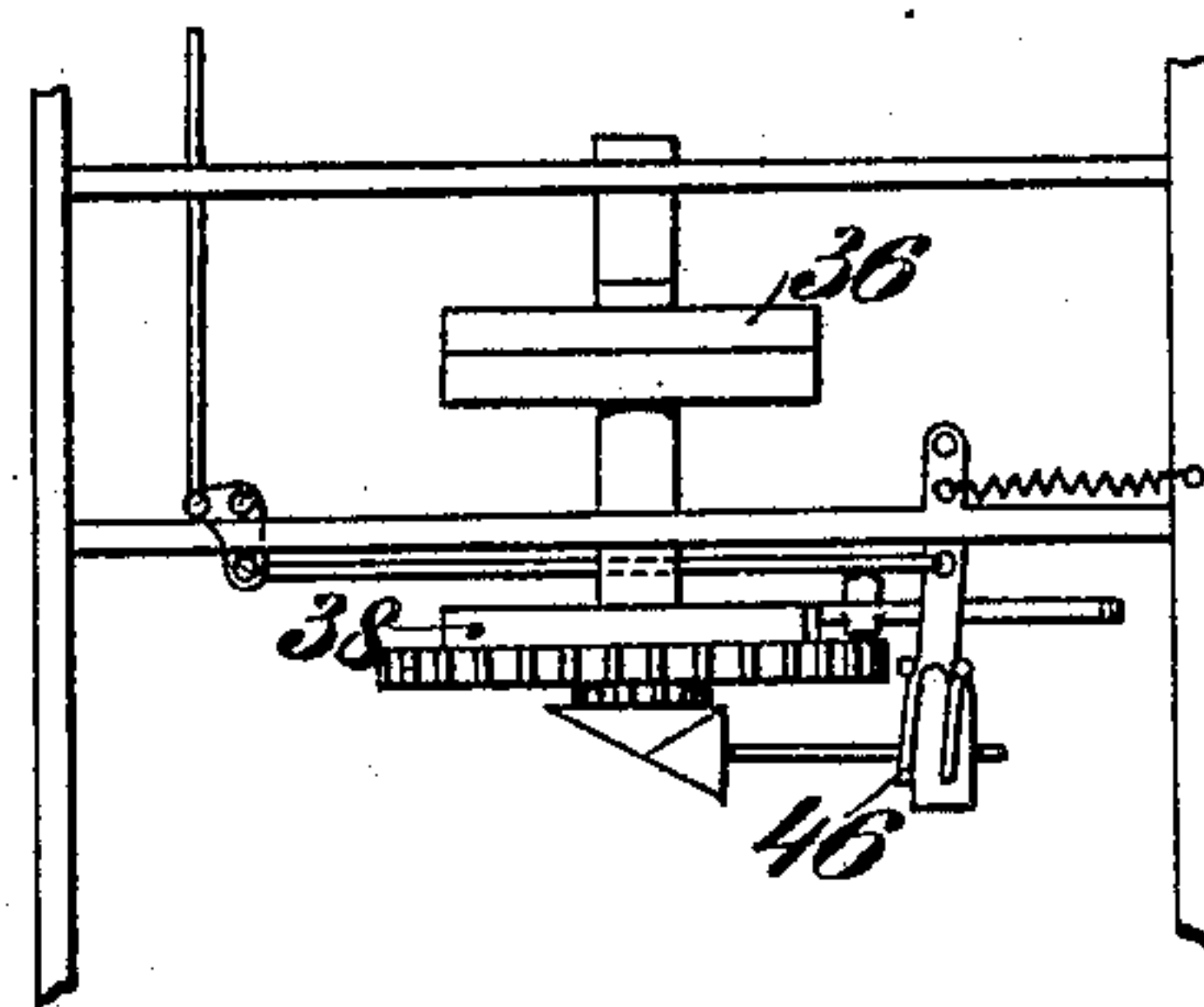


Fig. 4.



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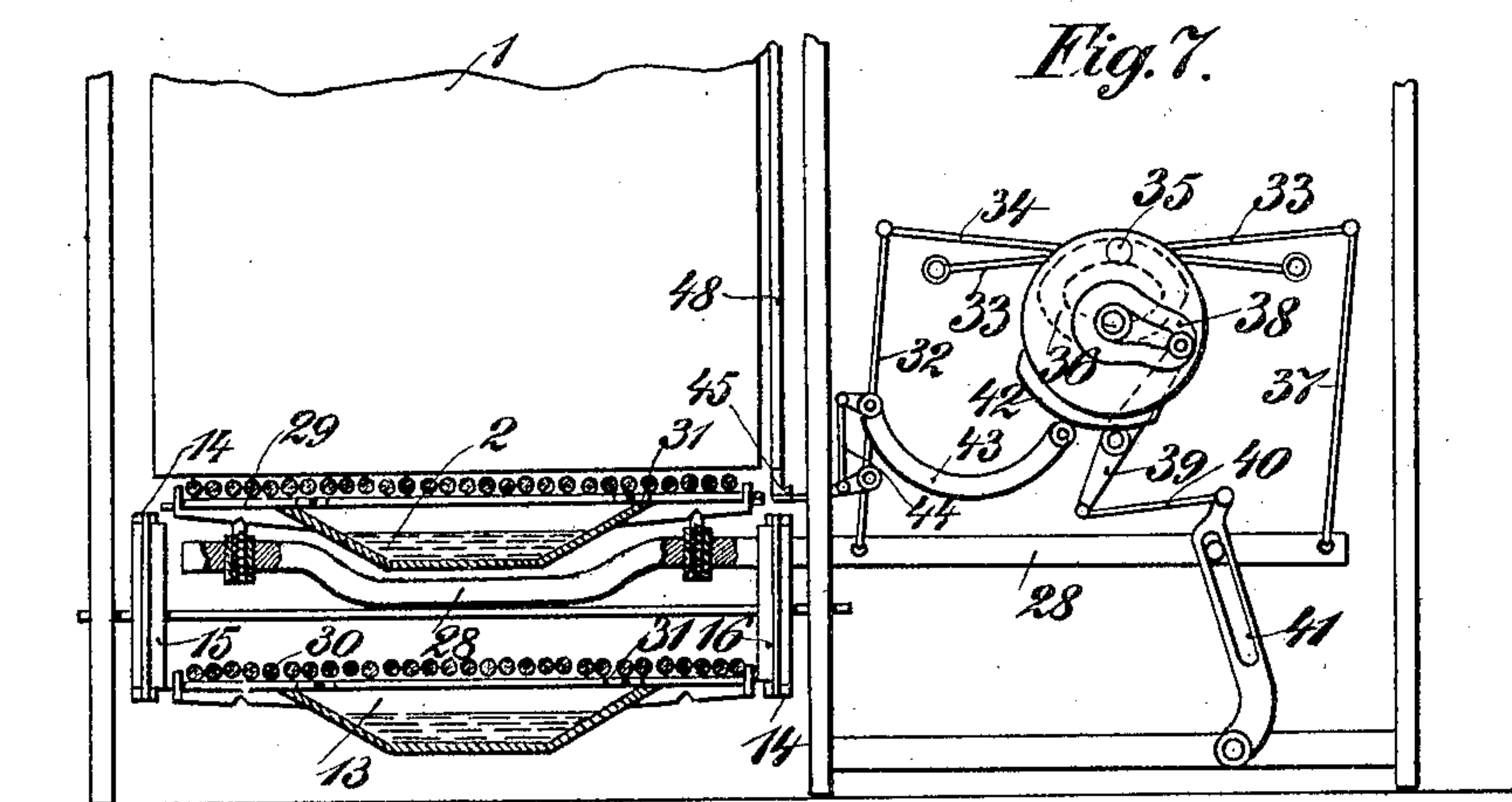
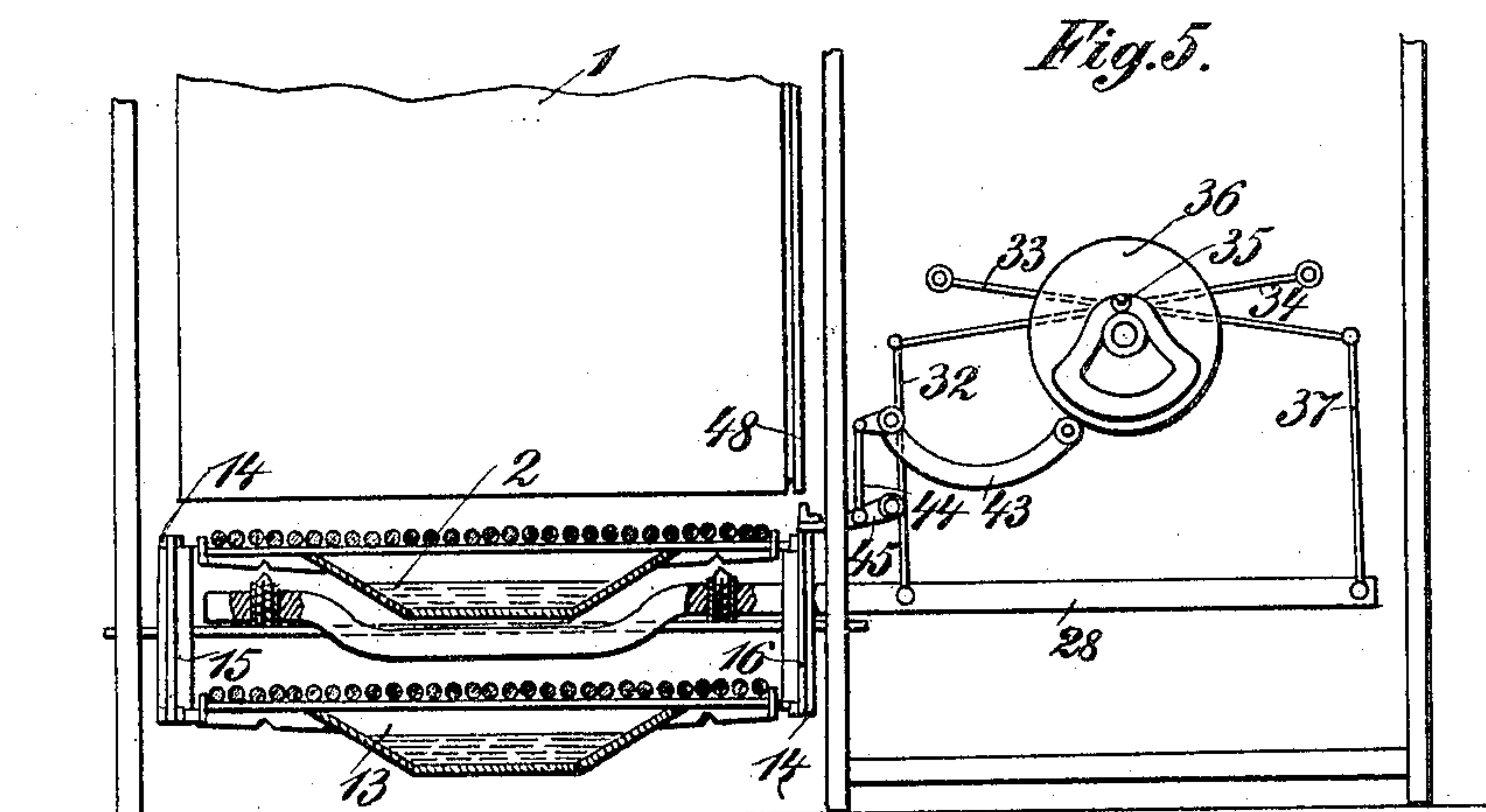
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4 SHEETS—SHEET 3.



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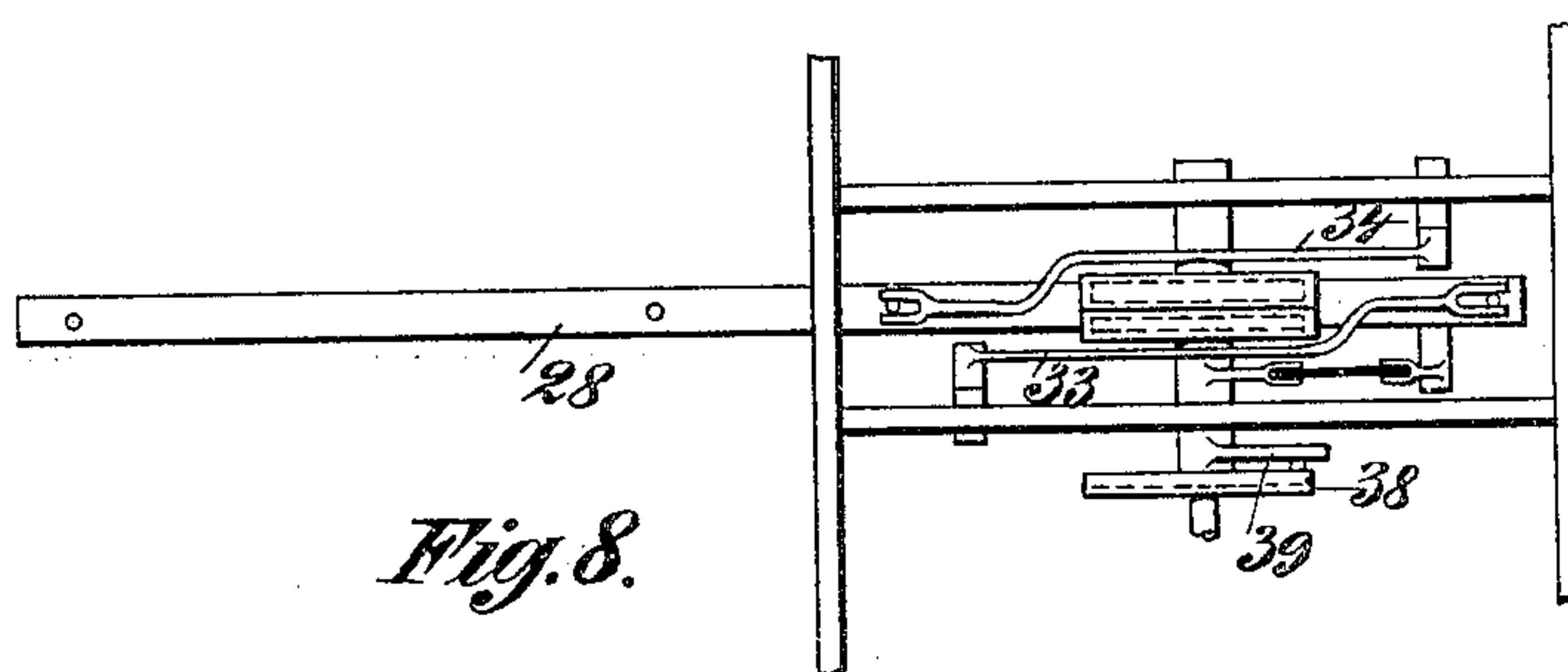
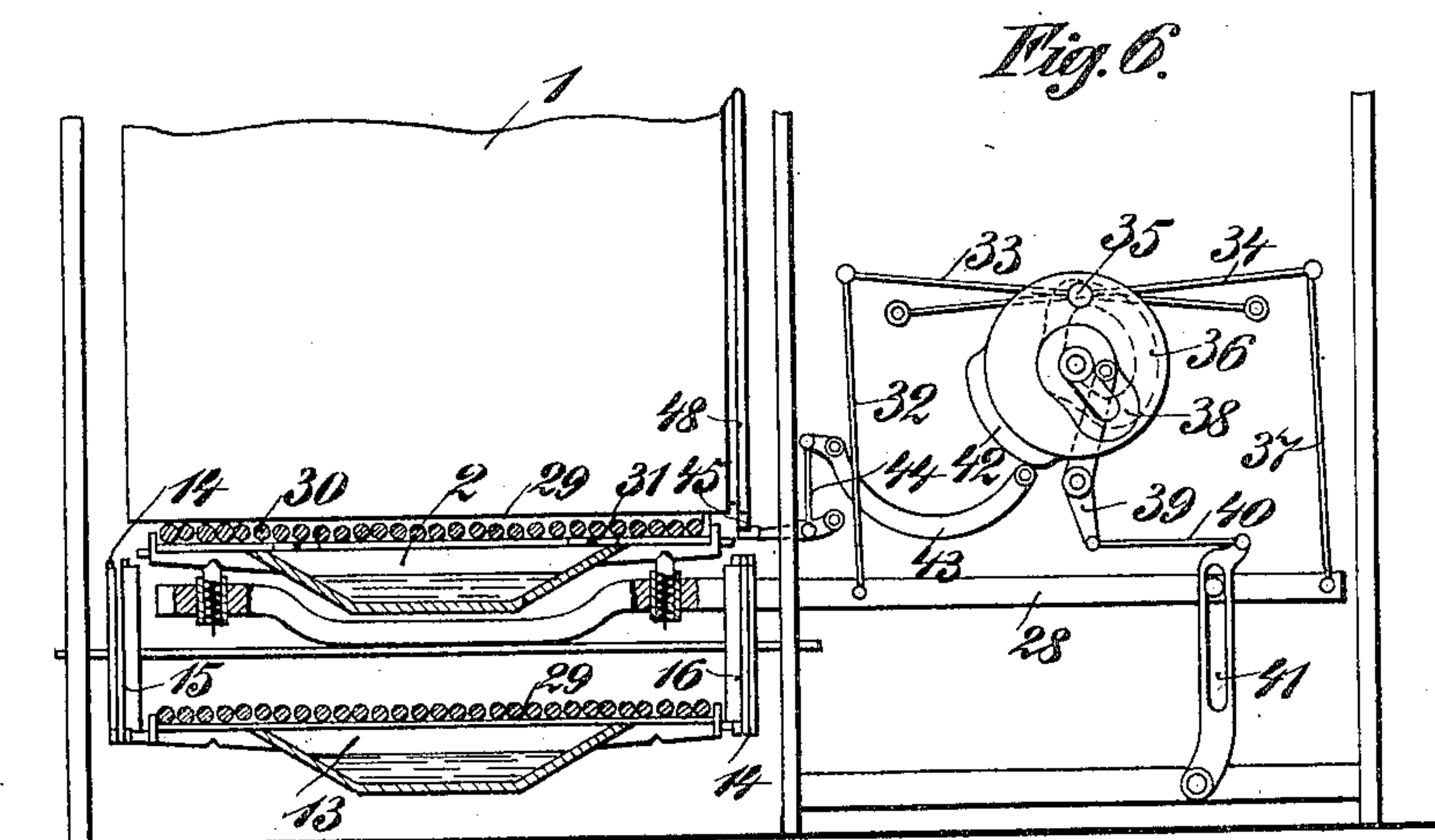
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

FRANZ SCHMIDT, OF OBERSCHÖNEWEIDE, GERMANY.

PRINTING MECHANISM FOR WARP-PRINTING DEVICES.

No. 822,308.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed September 12, 1903. Serial No. 172,908.

To all whom it may concern:

Be it known that I, FRANZ SCHMIDT, factory proprietor, a subject of the German Emperor, residing at 7 Edisonstrasse, Oberschöne-
weide, near Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Printing Mechanism for Warp-Printing Devices, of which the following is a specification.

10 The devices hitherto used for warp-printing, wherein the material—stretched, for instance, upon a printing-drum—was printed with crude colored streaks by means of a printing-wheel of large diameter running in a
15 color-trough, have numerous drawbacks.

This printing process did not yield the accuracy and finenesses such as are essential for a line of goods upon whose beauty very great demands were made. The crude streaks of
20 color produced with the printing-wheel had subsequently to be singly or collectively mechanically rubbed down (equalized) by hand, because, owing to the uncertain manipulation of the drum during printing or else to too
25 great a clearance for the bearings of the printing-wheels and of the carriage-axles, the streaks of color often did not lie close together.

The large diameter of the printing-wheel
30 necessitated the use of thick or stodgy color, which was absorbed with difficulty by the material to be printed and which, furthermore, attached itself in thick coils to both sides of the printing-wheel bed, so that during the subsequent tedious rubbing down a
35 smearing together of different colors was hardly to be avoided. Isolated streaks of color (the outlines in the material) almost always were deprived of their fineness by
40 this printing process. The coils or rolls of coloring material protruding on both sides under the printing-wheel also rendered difficult the use of the coal-tar colors already cold on falling out of the solutions, as the de-
45 posits of color, especially in the case of mixed colors, always remain more or less visible. Furthermore, the coloring material was not uniformly applied, because the less color taken up by the printing-wheel the more the color-
50 trough emptied itself, an irregularity which could not be made good even by the subsequent equalizing process.

The thickness of the printing-colors to be used also gave rise to the drawback that a
55 supersaturation of the fiber material had to be made, the consequence of which was that

during the subsequent steaming the sulfuric-acid salts, which are indispensable for printing, greedily sucked up the condensed water, whereby the paste or thickening was
60 changed into a watery condition. Consequently the various colors easily ran, especially when the fiber material did not lie exactly horizontal.

The object of the present invention is to do
65 away with these drawbacks and also to introduce a number of advantages.

According to this invention the printing is done with a number of series of mounted rollers of, if necessary, very small diameter,
70 which during the printing process are mutually pressed upon the yarn. In this way the advantage is obtained that the series of rollers has only to traverse a short path, and nevertheless the printing process is a more
75 effective one than that obtained with the apparatus hitherto used having a large roller. If, for instance, the rollers are moved over a path which corresponds to a manifold circum-
80 ference of a roller, then the same places of the yarn will, on moving the roller system, be printed over several times, as a subsequent roller will travel over the path which has been traversed by its predecessor. This mul-
85 tiple printing with the rollers traveling in the same direction can be multiplied at will by extending the path of the throw. As rollers of very small diameter can be used, it is possible to employ thin liquid colors, so that all the hereinbefore-mentioned drawbacks ac-
90 companying the use of thick colors are done away with.

While formerly it was found necessary, owing to the large throw of the big printing-wheel, (over the entire breadth of the warp-
95 drum,) to allow the printing-wheel carriage to run on rails and to impart movement to it by hand, the small throw permits of the application of self-acting gearing. Due to this, on the one hand, the printing process and, on the
100 other, a changing of the color-boxes carrying the rollers can be carried out. To enable this to be done, it is important that both the mutual pressure as well as the horizontal movement of the rollers requisite for printing be
105 effected by a common cross-piece or the like. To this cross-piece such movements are given that it lifts the color-box required for printing at the moment out of its bearings and moves it in the direction of the lines connect-
110 ing the central points of the rollers.

For effecting the interchangeability of the

several color-boxes endless chains or the like are herein employed, by whose movement the color-boxes are brought consecutively above the cross-piece, so that it can seize and move them.

In order to insure a firm position of the warp-carrier on commencing the operation of the cross-piece and during the printing process, a locking device is actuated by the device which moves the cross-piece in such wise that shortly before or during the throw of the cross-piece it engages with the yarn-carrier and holds it fast till the termination of the printing process.

Furthermore, in order to render the transmitting devices as simple as possible two curved disks or eccentrics are herein employed for effecting the movements of the color-boxes, one of which causes the lift and pressure upon the yarn, while the other executes the "printing movement," properly so called. This is effected by having the first curved disk connected to the cross-piece by links, while the second engages therewith by means of a connecting-lever. At the same time one of the curved disks can also be used for driving the locking contrivance.

As the changing of the color-boxes is also to be effected by mechanical means, means must be provided to hold them fast under the warp-carrier and above the cross-piece, respectively, in the proper position. For this purpose it is important that the mechanism previously started, say, by hand, be stopped as soon as a new color-box has taken up its position above the cross-piece. For this purpose it is advantageous to use a wheel or disk provided with pins or the like engaging with these slots in succession as the wheel or disk turns, the said pins being connected with a mechanism in such manner that after a certain travel corresponding to the distance between two color-boxes or the like the belt is thrown out of gear. This mechanism consists, substantially, of a double lever swinging upon a fulcrum, one arm of which is engaged and lifted by the pins, the other arm moving downwardly, and thereby turning into its initial position, the lever connected with the belt-fork, whereby the belt-fork, specifically the belt, is moved from the fixed disk or pulley upon the loose pulley.

Besides the advantage already mentioned of using thin liquid color the present apparatus offers many other advantages. The printing can be carried out much more quickly than with the old apparatus, as the lifts or throws are very slight. As during the printing process the drum can no longer make lateral movements, the printing-strips become sharply defined. A considerable saving of time is also effected, the engagement or bringing into gear of the driving mechanism conveying the several color-boxes above the cross-piece being effected by the simple

movement of a lever or the like. As the color-boxes may be situated on the endless chain below the printing device—*e. g.*, the warp-printing drum—and do not require to change their position, they do not stop the work in any way and cannot be so easily mistaken the one for the other as was formerly the case. For handling the new apparatus fewer assistants are required than with the old apparatus.

The drawings represent a method of application of the new device applied to a drum printing-machine.

Figure 1 is a side elevation of the drum with the changing device for the color-boxes located beneath it. Fig. 2 is an elevation of the drum in the longitudinal direction and shows the position of the color-boxes, of the cross-piece, and of the gearing requisite for moving the cross-piece. Fig. 3 is a plan view of the automatic disengaging device for the endless chains. Fig. 4 is a plan view of the gearing with the two curved disks serving for the movement of the cross-piece 28. Figs. 5 and 6 are views showing the connection of the two curved disks with the cross-piece. In Fig. 6 the cross-piece is shown in the raised position. Fig. 7 is a view showing the position of the color-box containing the rollers at the moment when it has terminated its throw to the left and will return to the right, and Fig. 8 shows in plan the connection of the cross-piece with the driving devices. Fig. 9 is a side view, on a larger scale, of the automatic mechanism for displacing the belt to throw the chain out of gear according to Fig. 3.

Beneath the warp-drum 1, to be moved in the usual manner, there are located on disks 15 16 the endless chains 14, carrying the several color-boxes 2 3 4 to 13. The driving of these disks is effected by spur-wheel gearing and by belting. Upon the shaft of the left-hand disk 15 there is mounted the wheel 18, formed with slots 17, which are arranged in such a way that the sides of the open ends thereof consecutively engage the pins 19 and 20, and thus move the carrying-disk 21 for said pins, mounted upon a shaft. The throwing into gear of the belting is effected by the belt-fork 22 by means of the hand-lever 23 and the connecting-rod 24.

The driving mechanism 18 19 20 serves to displace the belt-fork by means of the disk 25 and 26 from the fixed pulley 27 upon the loose pulley as soon as the color-box reaches the proper place above a pressure-beam 28. This occurs in this manner: The pins 19 and 20 move the double lever into the position shown in Fig. 9 as the disk revolves, said double lever being secured rotatably to a shaft and drawn against a bar (projection) 54, fixed, for instance, to the frame by means of a spring 53. Hereby the lever 55, which is connected with the rod 24, is rotatable about

56 and carries the belt-fork 22 from the position shown in Figs. 3 and 9, where the plate runs on the fixed pulley, into the position shown in full lines, Fig. 9, and by this means the belt-fork, specifically the belt, is pushed from the fixed pulley 27 to the loose pulley.

The color-boxes are mounted upon the endless chains in such a way that they can be freely taken off in an upward direction—i. e., toward the top. In the present instance they each consist of a color-receptacle and a bar or device having a channel 29 therein for the series-mounted color-rollers 30. The base of the channel or groove 29 has numerous small apertures 31 therein, (though but two are shown in the drawings,) through which the color, owing to the shaking movement exerted on the color-boxes, can pass from the lower color-receptacle into the channel. The peripheries of the rollers 30 work in contact with each other, the flat ends thereof lying in the same planes with the longer sides of the color-boxes, the axes of the rollers being parallel to the chains 14. The cross-piece 28, arranged below the printing-drum 1, is suspended from jointed bars 32 37, which are articulated to the supporting-beams 33 34. A sliding rod or stone 35, operating these supporting-beams, engages with a curved disk 36. By rotating this curved disk the jointed bars 32 37, and with them the cross-piece 28, are lifted. Upon the same shaft with the curved disk 36 there is mounted a second curved disk 38, which is connected by a rotary lever 39 and a jointed rod 40 with a pivoted sliding rod 41. On rotating the curved disk 38 the sliding rod 41 is moved so that it carries the cross-piece 28 along with it in a horizontal direction. On the curved disk 38 there is a stop 42, against which there bears a lever 43, rotatable round its fulcrum. This lever 43 is connected to a pawl 45 by the bar 44. On the periphery of the warp-drum 1 there is located a spur-gearing 48, with which the pawl 45 engages on lifting.

The two curved disks are placed in motion by belting that can be thrown out of gear in the manner known. The belting-fork 46, Figs. 2 and 4, serves for throwing it in and out of gear.

The operation of the apparatus is as follows: Assuming that the printing with one predetermined color is terminated and the operator wishes to print with a second color, he then pulls over the lever 23, and thus by moving the fork 22 throws the belt onto the fast pulley and then again releases his hold of the hand-lever. Consequently the endless chains are placed in motion till the next color-box has come into position above the cross-piece 28. At this moment the disengaging device 18 19 20 comes into play, so that the endless chains come to a standstill. If the color-box standing above the cross-piece is

not yet the one desired, then the attendant must operate the lever 23 several times till the color-box desired is above the cross-piece.

If the drum be properly adjusted, the printing process can then be proceeded with by throwing the drum into gear with the belt-fork 46. The cross-piece 28 is thus lifted by the curved disk 36, passes under the color-box, lifts it out of its bearings, and presses the color-rollers against the warps. By means of the curved disk 38 it is then moved parallel to the axis of the drum and again moved back. Owing to this movement, the color from the lowest color-receptacle can also be thrown into the upper channel. Upon termination of the printing process the cross-piece is again lowered and returns the color-box to its bearing. The printing-roller can hereupon be moved farther and, printing with the same color, can be carried out at another part of the yarn, or another color-box can be brought into position above the cross-piece.

The apparatus can be altered in various ways. For instance, the color-boxes may have a different shape. It is also not absolutely necessary that the movements imparted to the rollers be effected by the means herein shown, as other moving devices can also be used for this purpose. In any case it is essential that the printing be effected by the simultaneous movement of a number of series-mounted rollers, which during the printing process are mutually pressed upon the yarn.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A printing mechanism for warp-printing machines, comprising a printing-drum carrying the yarn, a number of series of traveling rollers, means for applying color to the rollers of each series, and means for pressing the rollers of each series against the yarn simultaneously and with a bodily-reciprocating movement parallel with the axis of the drum.

2. In a device of the character described, the combination with a printing-drum, of a series of rollers arranged in proximity to the periphery of the drum, means for bringing all the rollers into contact with the said periphery simultaneously, and means for moving the rollers bodily across said periphery.

3. In a device of the character described, the combination with a printing-drum, of a pair of shafts, a pair of gear-wheels on each shaft, an endless chain connecting a gear-wheel on one shaft with a gear-wheel on the other shaft, a second endless chain connecting the other said gear-wheels, parallel bars arranged transversely between said chains, rollers organized in series and carried by said parallel bars and arranged in proximity to the periphery of said printing-drum, and transverse to the axis thereof, means for ro-

tating said endless chains, and means for moving said rollers into contact with the periphery of said drum.

4. In devices of the character described, the combination with the printing-drum, of a series of rollers in proximity to the periphery of the drum, a color-box beneath the rollers, means for moving the rollers and color-box together, so as to bring them into operative position relatively to the drum, and means for raising the said rollers and color-box to carry the former into engagement with said drum.

5. In devices of the character described, the combination with the printing-drum, of a series of rollers in proximity to the periphery of the drum, a color-box beneath the rollers, means for moving the rollers and color-box together, so as to bring them into operative position relatively to the drum, means for raising the rollers and color-box to carry the former into engagement with the drum, and means for traversing the said rollers, when brought into engagement with the drum, in a direction parallel with the axis of the drum.

6. In a device of the character described, the combination with a printing-drum, of a pair of endless belts, a series of bars carried transversely by said belts, a series of endless rollers carried by said bars, a color-box secured to each of said bars, means for moving the endless belts so as to bring each bar and color-box into a certain position in proximity to the periphery of said drum, and means for raising any of said positioned color-boxes with the bar and portions of the rollers in engagement therewith, into contact with the periphery of said drum and out of engagement with said endless belts.

7. In a device of the character described, the combination with a printing-drum, of a pair of endless belts, a series of bars carried transversely by said belts, rollers disposed in series and carried by said bars, a color-box secured to each of said bars, means for moving the endless belts so as to bring each bar and color-box into a certain position in proximity to the periphery of said drum, means for raising any of said positioned color-boxes with the bar and portions of the rollers in engagement therewith, into contact with the periphery of said drum and out of engagement with said endless belts, and means for traversing said transverse bar with the rollers and color-box transversely across the engaging periphery of the drum.

8. In a device of the character described, the combination with a printing-drum, of a pair of endless belts, a series of transverse bars connecting the belts, a color-box suspended from each transverse bar, and rollers disposed in series and carried by said transverse bars, said bars having apertures leading from the boxes to the roller-engaging face.

9. In a device of the character described, the combination with a printing-drum, of a pair of endless belts, a series of transverse bars carried by said belts, a color-box suspended from each of said bars, rollers disposed in series and carried by said transverse bar, said belts being supported so that the said bars and color-boxes may be brought successively to a certain position in proximity to the periphery of the drum, means for putting said endless belts in motion, and means for automatically arresting said belt when the next color-box comes into said certain position in proximity to the belt.

10. In a device of the character described, the combination with a printing-drum, of a pair of suitably-supported endless belts, a series of transverse bars carried by said belts, a series of rollers carried by said transverse bar, a color-box suspended from each of said bars, said endless belts being supported so as to bring said bars and color-boxes successively to a certain position opposite the periphery of said drum, a bar suspended from a pair of upright levers, a second pair of levers each having one end pivoted on a stationary fulcrum and the other end pivoted to one of said upright levers, a stem arranged to engage on said second pair of levers, and a rotatable disk having a cam-slot therein arranged to engage said stem by its walls and thereby raise and lower said levers and bar, said bar being disposed below the position of said color-boxes and connecting-bar, that the levers will raise the bar with the color-box and supported portion of the rollers into engagement with the periphery of the drum.

11. In a device of the character described, the combination with a printing-drum, of a pair of suitably-supported endless belts, a series of transverse bars carried by said belts, a series of rollers carried by said transverse bar, a color-box suspended from each of said bars, said endless belts being supported so as to bring said bars and color-boxes successively to a certain position opposite the periphery of said drum, a bar suspended from a pair of upright levers, a second pair of levers each having one end pivoted on a stationary fulcrum and the other end pivoted to one of said upright levers, a stem arranged to engage on said second pair of levers, a rotatable disk having a cam-slot therein arranged to engage said stem by its walls and thereby raise and lower said levers and bar, said bar being disposed below the position of said color-boxes and connecting-bar, that the levers will raise the bar with the color-box and supported portion of the rollers into engagement with the periphery of the drum, said cam-slot being arranged to retain the levers and bar with the rollers in engagement with the periphery of the drum for a period of time, a second disk having a cam-slot, a lever having a pin engaging said latter disk

at its slotted portion, and levers connecting
said latter lever with said color-box-raising
bar, said second cam-disk being so arranged
as to give said color-box-raising bar an end-
5 wise motion and thereby cause the engaging
portion of the rollers to move transversely
across the engaging periphery of the drum.

In testimony whereof I have hereunto set
my hand, in presence of two subscribing wit-
nesses, this 27th day of August, 1903.

FRANZ SCHMIDT.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.