

W. L. SAUNDERS.
INTERLEAVING MECHANISM.
APPLICATION FILED NOV. 17, 1908.

963,946.

Patented July 12, 1910.

4 SHEETS—SHEET 1.

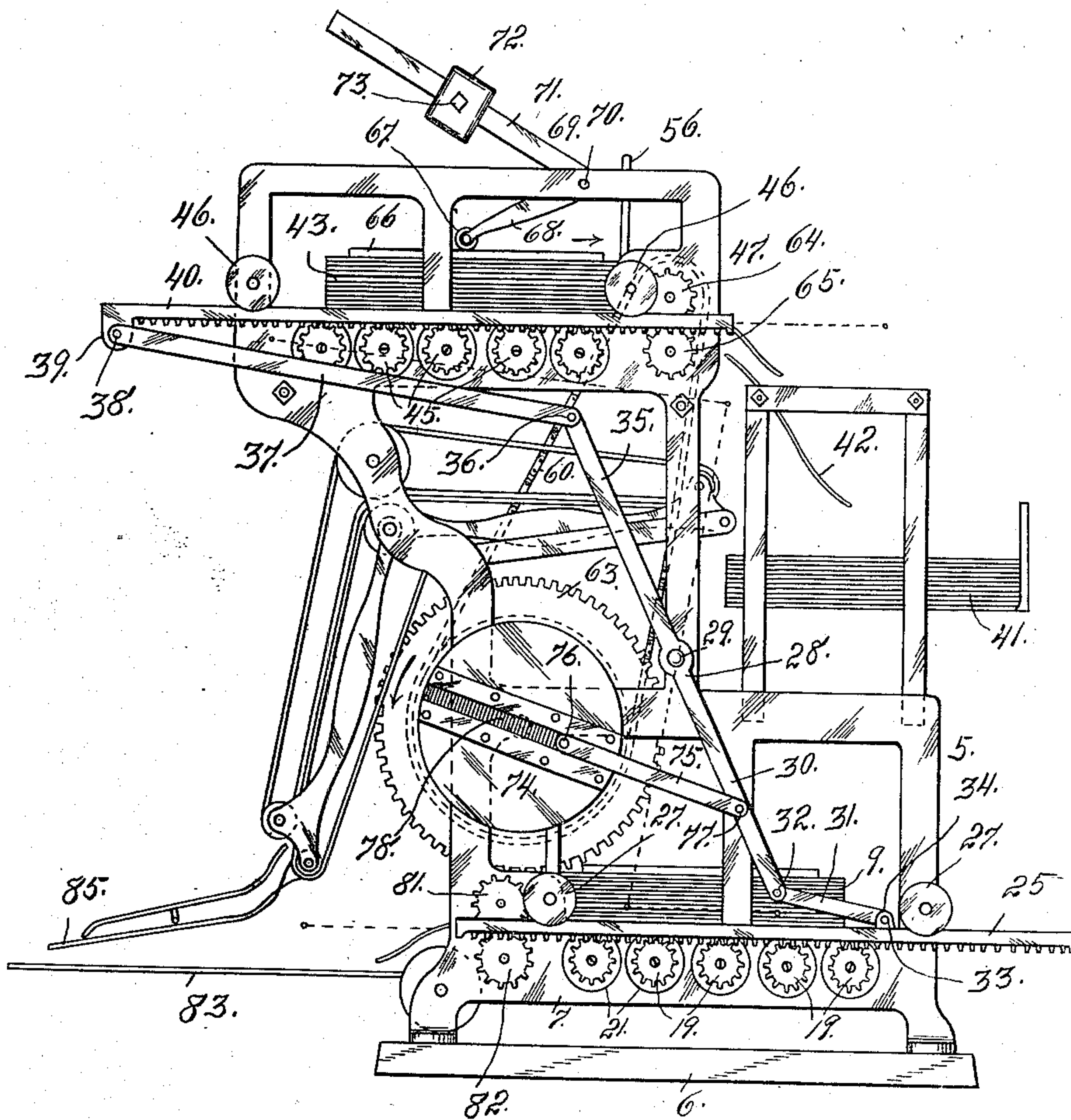


Fig. 1.

Witnesses

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[Signature]

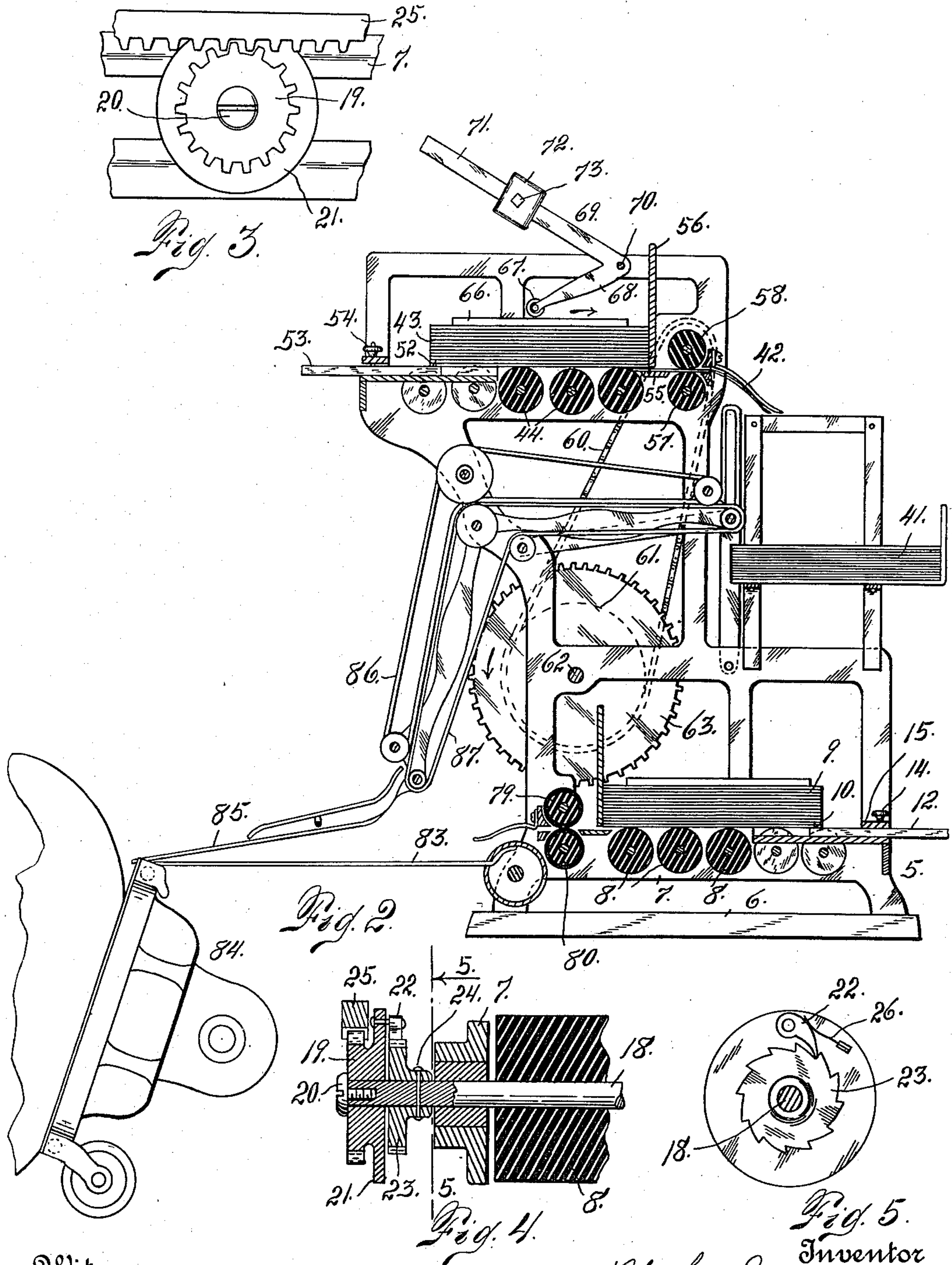
Attorney

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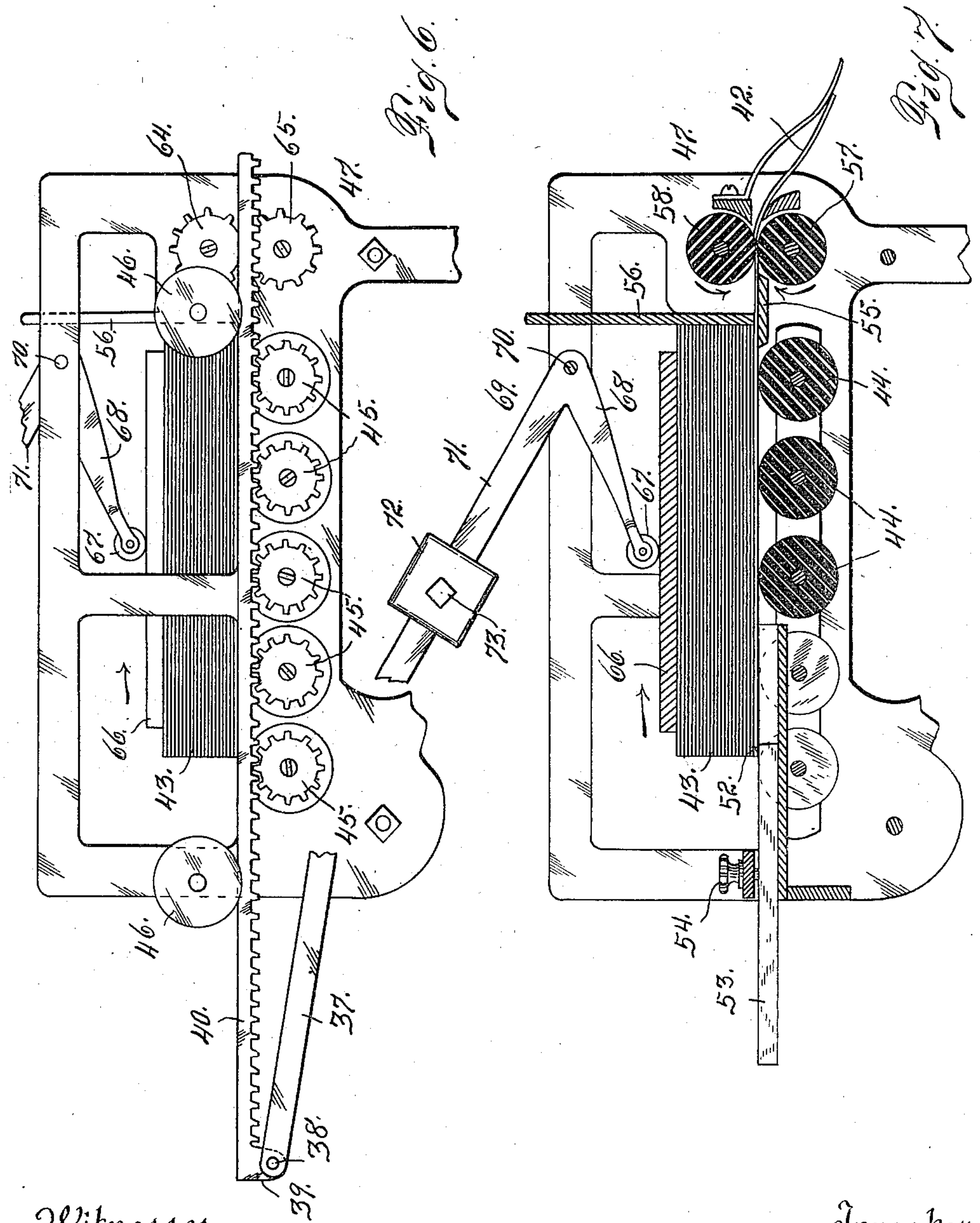
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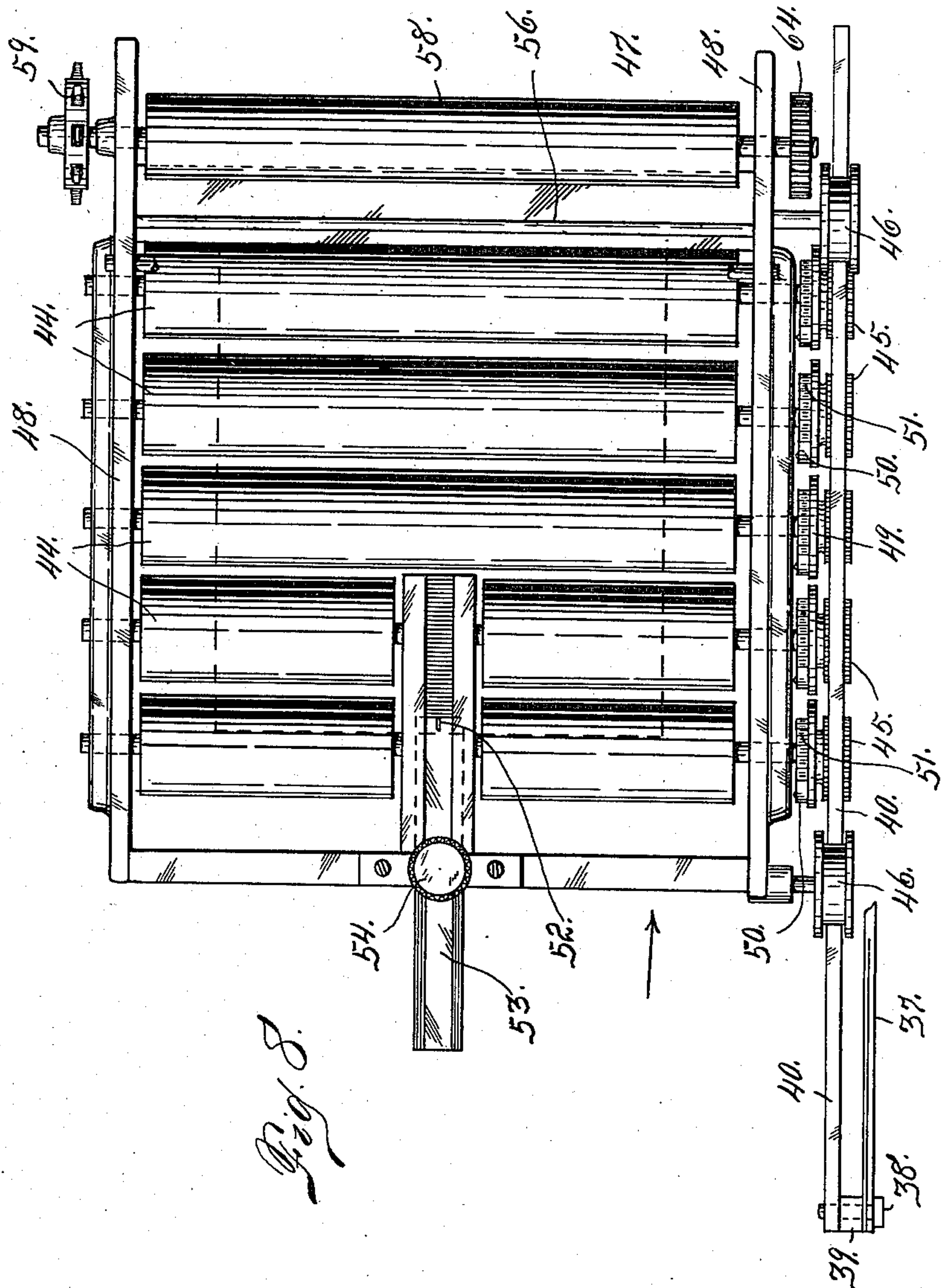
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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INTERLEAVING MECHANISM.

963,946.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed November 17, 1908. Serial No. 463,020.

To all whom it may concern:

Be it known that I, WILLIAM L. SAUNDERS, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Interleaving Mechanism; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

My invention relates to improvements in interleaving mechanism being more especially adapted for use in placing blank sheets of paper between printed sheets as the latter are successively delivered to a suitable support from a printing machine. In other words, my improvement is adapted for use in connection with the sheet delivery mechanism connected with a printing machine and may be employed to advantage in connection with the mechanism set forth in my previous application entitled "Automatic paper feeders" Serial No. 440,134 filed June 24th 1908.

My improved interleaving mechanism is similar in construction to the mechanism for feeding the sheets of paper successively to the press as illustrated in the aforesaid application, but is so located that the sheets of paper successively displaced are dropped between the printed sheets which are deposited upon a suitable support by any suitable delivery mechanism.

My improved interleaving mechanism consists of means for successively removing sheets of paper from a pile of sheets through the agency of rollers suitably arranged, the rear extremity of the lowermost sheet being temporarily retained by a short brad or tooth which also penetrates the adjacent sheet, or the sheet next to the one directly acted upon by the feed rollers. By virtue of my improved construction, the feed rollers remove the sheet directly acted upon, while the next sheet, or the one in contact with the removed sheet, is held by the retaining tooth or brad. The pile of sheets is acted upon by a suitable tension device arranged to automatically adjust itself in such a manner that a substantially constant tension or

pressure is exerted upon the pile of sheets in a direction toward the surface from which the sheets are being successively removed.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a side elevation showing my improvement in connection with a machine equipped with paper feeding and delivery mechanism. Fig. 2 is a view of the same mechanism shown partly in vertical section. Fig. 3 is a detail view showing the rack and pinion mechanism for actuating the feed rollers of the interleaving mechanism, the parts being shown on a larger scale. Fig. 4 is a sectional view in detail illustrating one of the feed rollers and the ratchet and pawl mechanism for operating the same, shown in connection with the rack and pinion illustrated in the previous figure. Fig. 5 is a face view of the ratchet and pawl illustrated in Fig. 4. This may be termed a section taken on the line 5—5 Fig. 4 viewed in the direction of the arrow. Fig. 6 is an elevation of the interleaving mechanism shown on a larger scale, the paper feeding and delivery mechanism being broken away. Fig. 7 is a sectional view of the same. Fig. 8 is a top plan view of the interleaving mechanism, the upright plate at the forward extremity of the device being shown in section. In this view the position of the pile of sheets is indicated by dotted lines.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the stationary frame-work of the complete machine with which my improved interleaving mechanism is employed. This frame-work as shown in the drawing, is provided with a base or support 6. The lower part of the frame is equipped with horizontally disposed separated side bars 7, in which are journaled rollers 8, whose body portions are preferably composed of rubber, in order to produce the necessary friction for actuating the sheets of paper of which the pad 9 is composed. The lowermost sheet of this pad rests directly upon these rollers. The rear end of the pad of sheets is slightly supported by a tooth 10 mounted in the for-

ward extremity of a tongue 12 which is adjustably mounted in the central portion of the base of the frame. This tongue is held in any desired position of adjustment by a set screw 14, threaded into a transverse block 15 attached to the frame above the tongue 13.

The journal at one extremity of each roller 8 is extended, as shown at 18 (see Fig. 4), and upon it is journaled a gear 19 held in place by a screw 20, threaded into the extremity of the journal. This gear is provided with an interior disk or peripheral flange 21 upon which is mounted a spring-actuated pawl 22, adapted to engage the teeth of a ratchet wheel 23 made fast to the spindle in any suitable manner, as by a key 24, passed through the hub of the ratchet wheel into the spindle.

The gears of all of the feed rollers are engaged from above by a rack-bar 25 which, when moved forwardly or toward the left, referring to Figs. 1 and 2, actuates the rollers since the spring pawl of each gear is adapted to engage a ratchet wheel in such a manner as to turn these rollers in a direction to feed a sheet of paper forwardly. When the rack bar, however, is moved in the opposite direction, the pawls 22 of the various gears slip over their corresponding ratchet wheels without any movement, since each pawl is held in operative relation with its ratchet by a spring 26 (see Fig. 5). Hence, during the reverse movement of the bar 25, the feed rollers 8 do not rotate. The rack bar is held in operative relation with its series of engaging gears by guide rollers 27, journaled on the frame-work above said bar and having grooved peripheries into which the upper edge of the rack bar projects, the said rollers being journaled near the opposite extremities of the frame.

The rack bar 25 is reciprocated through the instrumentality of a lever 28 fulcrumed on the frame as shown at 29. An arm 30 of this lever is pivotally connected with one extremity of a link 31 as shown at 32, the opposite extremity of the link being pivotally connected as shown at 33 with a lug 34, with which the rack is provided.

The opposite arm 35 of the lever 28 is pivotally connected as shown at 36, with one extremity of a link 37 whose opposite extremity is pivotally connected as shown at 38, with a depending lug 39 of a rack bar 40 which is substantially the same as the rack bar 25, but which to avoid confusion in the specification, is given a different reference character. This rack bar 40 forms a part of the interleaving mechanism, which mechanism is substantially a duplication of the feed mechanism heretofore described, or the mechanism for feeding the sheets of paper to be printed, to the press.

The interleaving mechanism is operated

by the same devices that actuate the feed mechanism, and by virtue of its construction, and arrangement, delivers an interleaving sheet of paper to the pad 41 of printed sheets, every time a sheet is removed from the pad 9 and fed to the printing machine.

It will be understood by reference to Figs. 1 and 2 of the drawing, that as the interleaving sheets 42 are removed from the pad 43, they are caused to travel in a direction opposite that of the sheets removed from the pad 9 and in order that the feed mechanism and the interleaving mechanism may be operated in harmony, the former is actuated by the lower arm of the lever 28, while the latter is actuated by the upper arm of the lever, the two arms, of course, traveling in opposite directions as the lever is actuated.

The rollers 44 of the interleaving mechanism, are each provided at one extremity with a gear 45 loosely mounted thereon, which is engaged by the rack bar 40, the said bar being held in operative relation with the gears by rollers 46 suitably journaled upon the frame-work 47, which supports the interleaving mechanism. This frame-work is provided with side bars 48 in which the rollers are journaled. The gear of each roller is provided with a disk 49 upon which is pivotally mounted a pawl 50 which engages a ratchet wheel 51 fast on the journal. This ratchet and pawl construction is substantially the same as that of the feed mechanism illustrated in Figs. 4 and 5, and for further details, reference is made to the last named figures and to the description of the said mechanism heretofore embodied in this specification.

The pad 43 of interleaving sheets rests upon the rollers 44 and the lower part of the rear extremity of the pad is engaged by a tooth or brad 52 mounted upon the forward extremity of a tongue 53 longitudinally adjustable on the interleaving frame-work and held in place by a set screw 54.

When referring to the interleaving mechanism, the term forward indicates movement toward the right or in the direction of the arrow in the various figures where this mechanism is illustrated, while the same term when applied to the mechanism for feeding the leaves of paper to be printed, indicates movement in the opposite direction or toward the left.

As the interleaving sheets are moved forwardly by the rollers 44, they are passed over a plate 55 and underneath a vertically disposed plate 56, which the forward extremity of the interleaving pad 43 engages. As the sheets 42 pass beyond the plate 55, they pass between two rollers 57 and 58 which are actuated to impart the forward movement to the leaves 42, whereby they are caused to drop upon the pad 41 of printed

5 sheets. The roller 58 is provided at one extremity with a sprocket wheel 59 which is engaged by a chain 60, leading from a wheel 61 fast on a spindle 62 journaled in the frame-work of the machine. A gear 63 is also fast on the same spindle. This gear may be connected with any suitable power (not shown) for operating the machine. In actual practice this gear is actuated from the printing press, but for the purposes of this application it is not necessary to illustrate this connection.

15 The roller 58 is provided at its extremity remote from the sprocket wheel 59 with a gear 64 meshing with a gear 65 fast on the spindle of the roller 57. By virtue of this gearing connection between the two rollers, motion is imparted to the roller 57 as well as to the roller 58, the two rollers turning in the direction indicated by the arrows in Fig. 7, or in a direction to move the interleaving sheets forwardly or toward the right, referring to the same figure.

25 Since, as illustrated in the drawing, the interleaving sheets are removed from the bottom of the pad 43, it is necessary that the pile or pad of sheets shall be subjected to downward pressure or to a tension which acts downwardly. Any suitable tension means may be employed. As shown in the drawing, a plate 66 is placed upon top of the pile 43 and upon this plate bears a roller 67 mounted upon an arm 68 of a lever 69 fulcrumed on the frame as shown in 70. Another arm 71 of this lever, is provided with a weight 72 adjustable thereto, by means of a set bolt 73. When the pad of sheets is of suitable height (see Figs. 6 and 7) the angle formed by the arm 68 of the lever, with the plane of the plate 66, is relatively small, but as the pile of sheets diminishes in height, the aforesaid angle increases. By reason of this peculiar construction and arrangement, the tension to which the pile of sheets is subjected, is approximately uniform, until all of the sheets have been removed from the pile.

45 The lever 28 is actuated for the purpose of imparting the necessary reciprocating movement to the rack bars 25 and 40, from a crank wheel 74 which is connected with the arm 30 of the lever by a link 75. One extremity of the link is connected with a wrist upon the crank wheel, as shown at 76, while the opposite extremity of this link is connected with the lever as shown at 77. The wrist of the crank wheel is preferably adjustable in a groove 78 whereby the throw or degree of movement imparted to the lever for the aforesaid purpose, may be regulated as desired. The adjustability of the wrist pin of the crank wheel is not illustrated since nothing is claimed thereon in this application.

65 From the foregoing description, the use

and operation of the interleaving mechanism will be readily understood. It will be assumed, however, that the mechanism for feeding the sheets of paper from the pile 9 to the printing machine, is actuated simultaneously with the operation of the interleaving mechanism. Assuming that the operating gear 63 is rotating in the direction indicated by the arrow (see Figs. 1 and 2) motion is imparted to two rollers 79 and 80 located forward of the feed rollers 8, the said rollers being provided with meshing gears 81 and 82. The direct connection between the gear 63 and the last named rollers is not illustrated in the drawing as it is not considered material. The sheets of paper are first removed successively from the bottom of the pad 9 by the rollers 8 and delivered to the rollers 79 and 80 which pass them to a belt 83 which carries the sheets to the platen 84 of the printing press (see Fig. 2). This belt 83 is mounted to reciprocate whereby after the sheet has been printed, it is moved in the reverse direction and deposited upon a part 85 by which it is delivered to two endless belts 86 and 87 suitably mounted and through whose agency the printed sheets are successively delivered to the pile 41 mounted upon the rear of the machine (see Figs. 1 and 2).

95 Simultaneously with the aforesaid feeding and delivery operations, the interleaving mechanism is actuated, the movement being initially imparted from the crank wheel 74 through the agency of the link 75, the lever 28, the link 37 and the rack bar 40 which engages the gears 45. The forward movement of this rack bar or its movement toward the right, imparts a corresponding movement to the rollers 44 through the instrumentality of the gears 45 and the ratchet and pawl connection between the loose gears and the rollers heretofore explained. During the reverse movement of the rack bar, the pawls slip over the teeth of the ratchet wheels 51 without imparting any movement to the rollers. During each forward movement of the rack bar 40, a sheet of paper is removed from the bottom of the pile 43 and delivered to the rollers 57 and 58 which discharge it from the machine and cause it to drop upon the pile 41 of printed sheets. By virtue of the special construction and arrangement of the mechanism, as illustrated in Fig. 1, it will be understood that there is an interleaving sheet removed from the pile 43 for every sheet removed from the pile 9 by the feed mechanism. Hence, for every printed sheet deposited upon the pile 41 there will be an interleaving sheet also deposited thereon. The object of placing these interleaving sheets upon the pad 41 between the printed sheets is to prevent the spreading of the ink upon the freshly printed sheets since until they have become

thoroughly dried, the best results cannot be obtained by allowing these sheets to come in actual contact with one another.

Having thus described my invention,
5 what I claim is:

1. The combination with means for placing printed sheets in a pile, of interleaving mechanism adapted to be operated in connection with a printing machine, a frame for
10 supporting sheets of paper to be printed, rollers mounted under said frame as means for removing individual sheets from said frame to be printed, a corresponding frame carrying interleaving sheets of paper, rollers
15 adapted to operate alternatively with said first-named rollers for removing said interleaving sheets from said frame, said rollers adapted to be operated in alternative relation by means of a crank bar connected with
20 a rack bar engaging gearing of said rollers, and a weighted bell crank lever adapted to press upon the interleaving sheets of paper as means for holding each successive bottom sheet in frictional engagement with said
25 rollers.

2. The combination with means for conveying printed sheets of paper from a printing press, and placing them in a pile, of interleaving mechanism operated in connection
30 with said printing press comprising a frame carrying sheets of paper, rollers in frictional engagement with said sheets as means for removing said sheets from said frame to conveying mechanism of a printing press, a
35 corresponding frame carrying interleaving sheets, rollers in frictional engagement with said sheets mounted under said frame as means of removing individual sheets therefrom, rack bars engaging gearing of said
40 first and second-named rollers, said rack

bars operated in alternative relation by means of an operating rod, connecting said rack bars as means of operating said rollers, and guide rollers for holding said rack bars in operative relation with said rollers. 45

3. The combination with means of conveying printed sheets of paper from a printing press and depositing them in a pile, of interleaving mechanism operated in connection
50 with said printing press, a frame for carrying sheets of paper to be printed, rollers frictionally engaging said sheets mounted under said frame as means of removing said sheets from said frame, rollers for engaging
55 said sheets after having been removed from said frame, as means of depositing said sheets on conveying mechanism of a printing press, a second frame positioned above said first named frame as means of holding
60 interleaving sheets, rollers journaled under said frame in frictional engagement with said interleaving sheets, means of engaging said sheets after having been removed from said frame to be deposited in interleaving
65 relation with printed sheets of paper, rack bars held in operative relation with gearing of said rollers, said rack bars connected with a link of an operating rod as means of operating said rollers to alternatively remove
70 sheets of paper to be printed and interleaving sheets, and depositing said sheets in interleaving relation, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM L. SAUNDERS.

Witnesses:

A. J. O'BRIEN,

A. EBERT O'BRIEN.