

No. 751,687.

PATENTED FEB. 9, 1904.

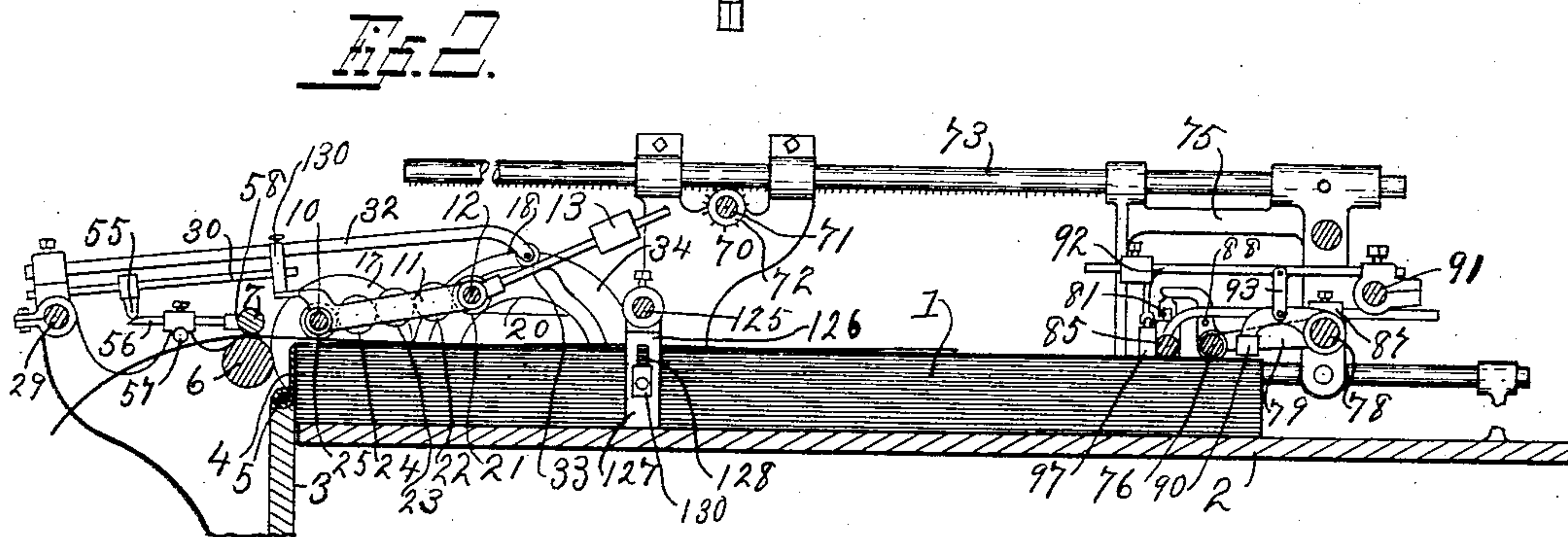
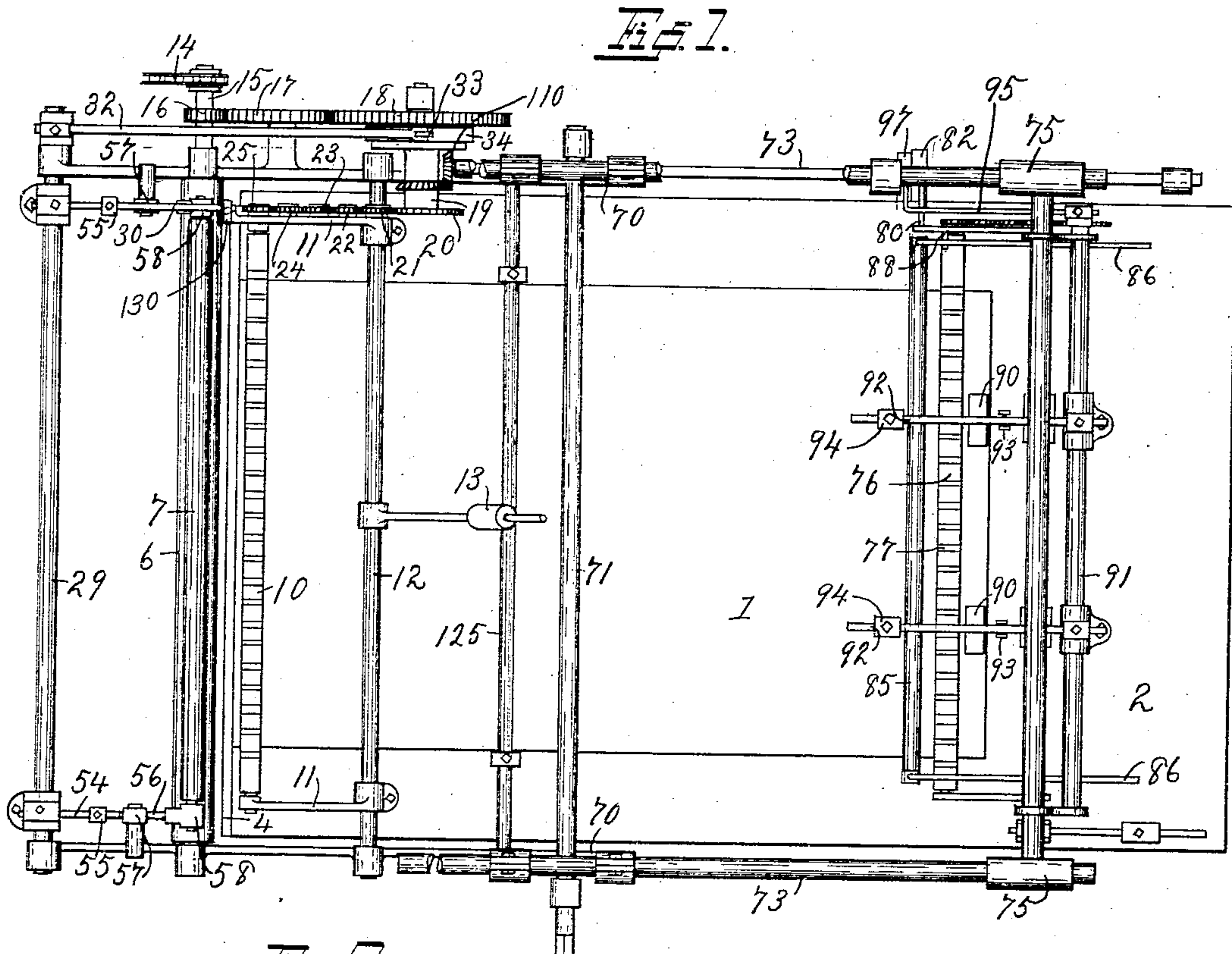
F. SCHILZ.

PAPER FEEDING DEVICE.

APPLICATION FILED JUNE 29, 1901.

NO MODEL.

3 SHEETS—SHEET 1.



**WITNESSES:**

Fach  
C. L. Roesch.

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No. 751,687.

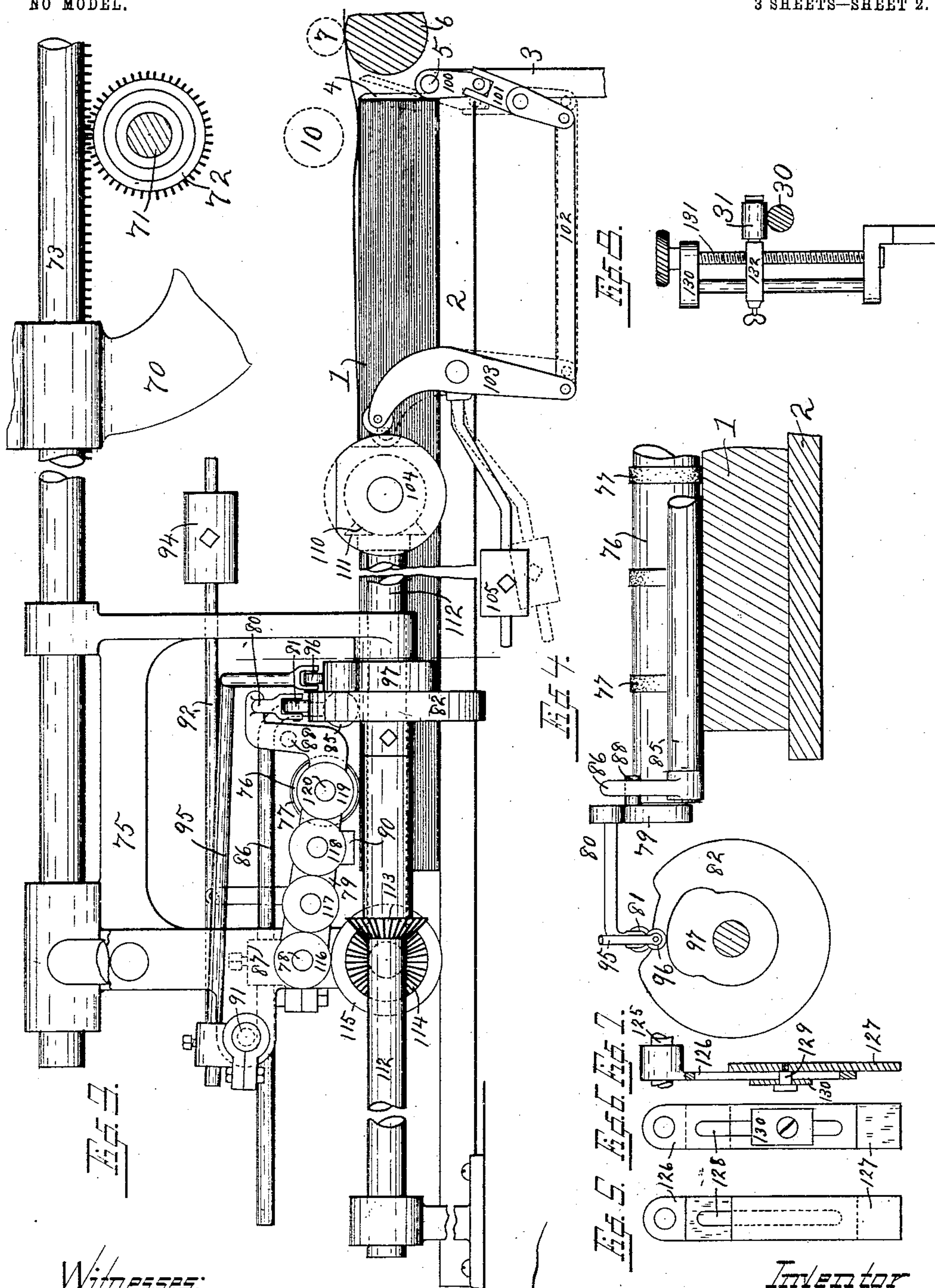
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PAPER FEEDING DEVICE.

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NO MODEL.

3 SHEETS—SHEET 2.



**Witnesses:**

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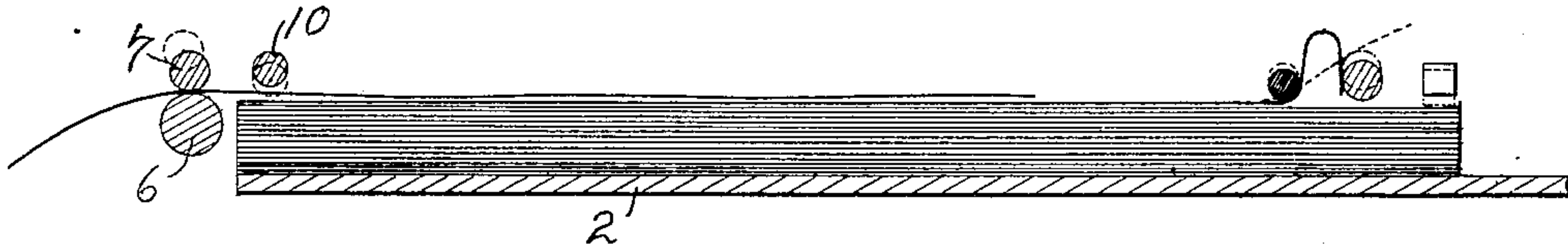
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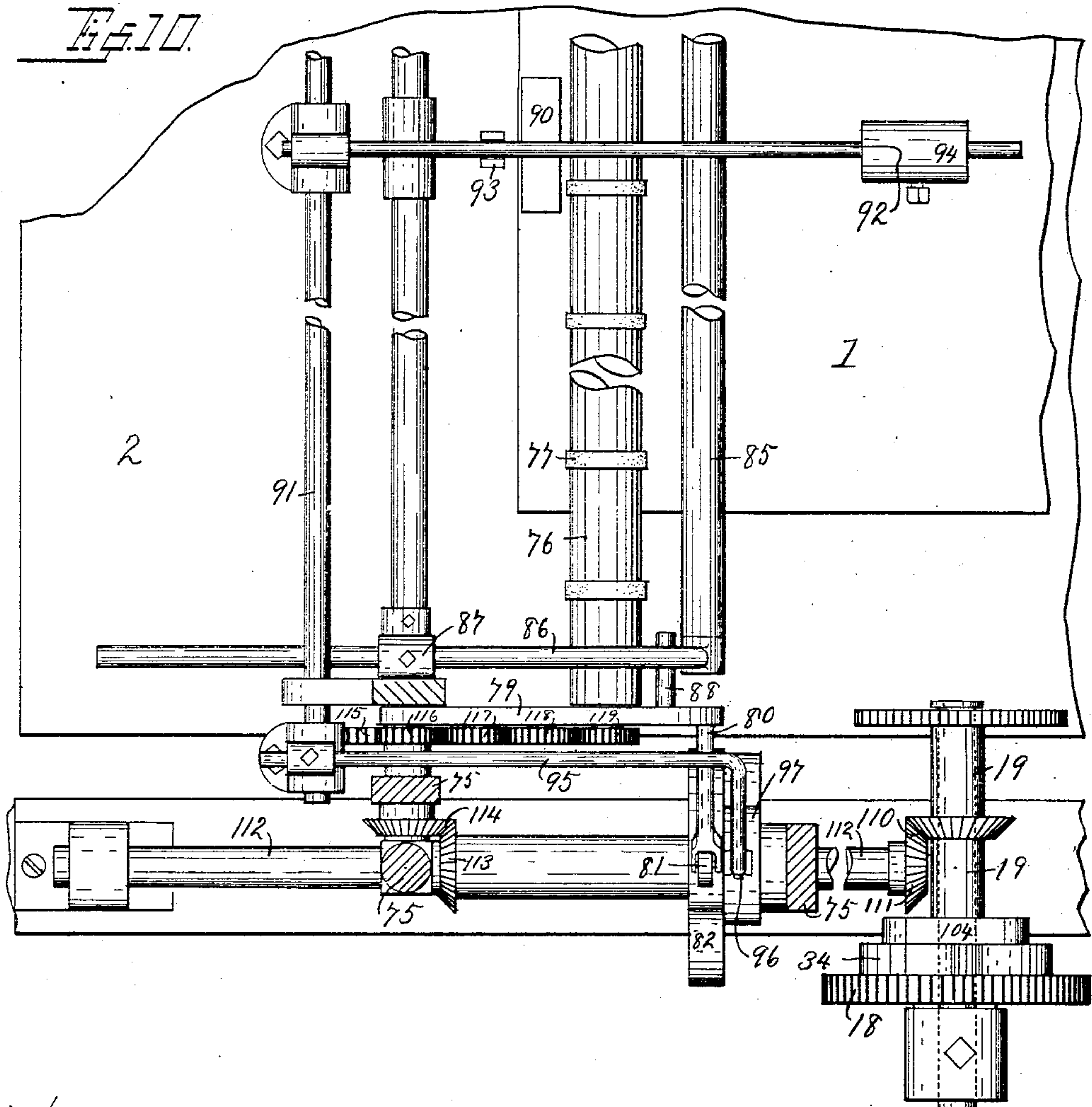
NO MODEL.

3 SHEETS—SHEET 3.

*Fig. 9.*



*Fig. 10.*



Witnesses:  
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# UNITED STATES PATENT OFFICE.

FRANK SCHILZ, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO HUGO  
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## PAPER-FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 751,687, dated February 9, 1904.

Application filed June 29, 1901. Serial No. 66,481. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK SCHILZ, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Paper-Feeding Devices, of which the following is a specification.

My invention relates to improvements in paper-feeding devices, with especial reference to that class of devices shown and described in my former application, Serial No. 731,405, filed September 23, 1899, and allowed March 27, 1901, the present invention being adapted to be used either in combination with the devices shown in such former application or independently in connection with other sheet-withdrawing mechanism.

The object of this invention is to provide for an initial separation of the top sheet along one edge preparatory to the operation of the sheet-withdrawing mechanism, whereby the sheet is not only individualized before it is moved or shifted horizontally on the pile, but a quantity of air is admitted between such sheet and the next succeeding sheet, which tends to travel in a wave from one end of the sheet to the other as the top sheet is withdrawn, and thus facilitates its separation with a minimum friction on the under sheets.

A further object is to provide means for keeping the lower sheets of the pile in position without interfering with the free discharge of the top sheet.

In the following description reference is had to the accompanying drawings, in which—

Figure 1 is a plan view of a paper-feeding machine embodying my invention, together with that shown in my former application. Fig. 2 is a side view of the same with the platform or bed-raising mechanism omitted, this being fully shown and described in said former application. Fig. 3 is a side view, in detail, of a portion of the mechanism as seen from the opposite side of the machine from that shown in Fig. 2. Fig. 4 is a detail of the mechanism for actuating the sheet-separating rollers as seen from the rear. Figs. 5, 6, and 7 are detail views of the adjustable side guards used to prevent the sheet from twisting while

it is being withdrawn. Fig. 8 is a detail view of the means for adjusting the movements of the feed and delivery rollers. Fig. 9 is a diagrammatic view of the sheet separating and feeding rollers as they appear when the top sheet is individualized, with dotted lines indicating the position of the rollers when the top sheet is started. Fig. 10 is a detail top view of the actuating connections of the sheet-separating mechanism.

Like parts are identified by the same reference characters throughout the several views, the same characters being also used in said former application to identify the package of paper 1, the feed-platform 2, wall 3, guard-wing 4 and its supporting-rod 5, sheet-withdrawing rollers 6 and 7, friction-roller 10 and its supporting-rod 12, with roller-supporting arms 11 and adjustable counterbalance 13, together with the means for rotating said rollers, consisting in a driving-sprocket 14 on the shaft 15 of the roller 6, motion-transmitting gears 16, 17, and 18, sleeve 19, and chain of gears 20 to 25, inclusive. In the present application I have also shown substantially the same mechanism for reciprocating the rollers 10 and 7 as in said former application and have applied the same reference characters thereto. The roller 10 is lifted and lowered from the gear-wheel 18 through the medium of the cam 34, antifriction-wheel 33, resting on said cam, arm 32, the oscillating cross-rod 29, arm 30, and stud 31, the latter being connected with the arm 11 of the roller 10, whereby the latter is lifted and depressed in correspondence with the position of the wheel 33 on the cam 34. The roller 7 is lifted and lowered through the medium of the arms 54 and 30, depending pins 55, and levers 56, fulcrumed at 57 and secured to the roller-bearings 58 of the roller 7. As all of these parts are fully shown and described in said former application, it is only necessary to state that by means of the above-mentioned mechanism the rollers 6 and 10 are revolved continuously, while the rollers 7 and 10 are lifted and depressed in alternation, the roller 7 being elevated when the roller 10 is in frictional contact with the paper to permit the sheet to pass freely between



rollers 6 and 7 and the roller 10 being lifted when the roller 7 is depressed, thus permitting the free withdrawal of the sheet by the rollers 6 and 7. To accomplish the objects of this invention, however, I have provided sheet-separating apparatus, which is located near the edge of the sheet opposite to the sheet-withdrawing mechanism above mentioned. Brackets 70 are mounted on the feed-platform 1 and furnish bearings for a cross-shaft 71, provided with pinions 72, and also for longitudinally-movable rack-bars 73, in mesh with pinions 72 on the respective sides of the machine. These rack-bars are provided with depending brackets 75, in which the sheet-separating mechanism is mounted, the brackets and mechanism supported thereby being thus capable of adjustment longitudinally of the feed-platform 1 by actuating the rack-bars 73 through the medium of the shaft 71 and pinions 72. By this means the separating mechanism can be adjusted to sheets of different lengths.

The sheet-separating mechanism comprises a separating-roller 76, provided with frictional material, rubber bands 77 being preferably used. The roller 76 is supported from a rod 78 by arms 79, one of which is offset at 80 and provided with an antifriction-roller 81, which travels on the eccentric periphery of a cam 82, the latter being so positioned that as the cam is rotated the roller 76 will be alternately lifted above the paper and lowered into contact therewith. A bar 85 is also supported by arms 86 from the rod 78, the arms being adjustably mounted in bearing-heads 87 on said rod. The bar 85 is thus made adjustable with reference to the roller 76 and is located beyond the latter, (in the direction of sheet movement,) the adjustments being made to widen the space between the bar 85 and roller 76 for a purpose hereinafter explained. Pins 88, projecting laterally from the arms 79 of the roller 76, are adapted to engage underneath the arms 86 of the bar 85, so that when the cam 82 lifts the arms 79 and roller 76 the pins will engage the arms 86 and lift the bar 85 also. The arms 86 are, however, so formed that the bar 85 will come into contact with the paper before the roller 76 completes its downward movement and remains in contact with the paper during the initial upward movement of roller 76 and until the pins 88 are brought into contact with the arms 86, when both the roller and bar will be lifted together. The bar 85 is preferably of metal or weighted, so as to exert a considerable downward pressure on the paper, while the roller 76 is light and may be counterbalanced, if desired, in the same manner as the roller 10. It will also be observed that the bar 85 is cylindrical in form, thus concentrating the downward pressure along a single line. If it is desired, however, to use a different form of bar, it should be adjusted with one edge bearing on the pa-

per in preference to a flat surface, as the pressure along a single straight line tends to cause the paper to bulge upwardly in the rear of the bar and facilitates the action of the roller in separating the top sheet. Sheet-holders 90 are used to retain the under sheets in place when the top sheet is withdrawn after it has been individualized. These consist of blocks 90, supported from a cross-rod 91 by means of weighted arms 92 and links 93. The weights 94 are preferably adjustable on the arms. The rod 91 is also provided with an arm 95, which carries an antifriction-wheel 96, which rests on the periphery of a cam 97, the cam being so formed with reference to the cam 82 as to lift the arm 95 simultaneously with the depression of the roller 76, the roller 76 and blocks 90 being thus lifted and depressed in alternation. The guard-wing 4 is arranged to cooperate with the holding-blocks 90. The supporting-rod 5 of the wing is provided with a depending arm 100, which is loosely engaged by a forked upper end of the lever 101, the latter being connected by a link 102 at its lower end with a lever 103, which is operated by means of a cam 104 and weight 105 in opposite directions, Fig. 3. When the cam is in the position in which it is shown in Fig. 3, the weight swings downwardly and communicates motion through the lever 103, link 102, lever 101, and arm 100 to tilt the wing 4 to an inclined position, as also shown in said figure, this movement being coincident with the depression of the roller 10 and the elevation of the roller 76 and bar 85. As the cam revolves, however, the upper end of the lever 103 is actuated to lift the weight 105 and through the medium of the intervening connections to swing the guard-wing 4 to a vertical position, and thus cooperate with the blocks 90 in holding back the under sheets. This movement of the wing takes place after the upper sheet has been started and at about the time that the delivery-rollers 6 and 7 are brought together. These rollers draw off the engaged sheet positively, and as sheets possessing a high frictional quality have a strong tendency to adhere the wing is therefore found very effective with some kinds of paper, while for smooth-faced sheets the holders 90 may be sufficient.

The roller 76 is continuously revolved, this motion being transmitted thereto from the sleeve 19, through the bevel-gears 110 and 111, shaft 112, bevel-gears 113 and 114, and the train of gears 115 to 119, inclusive, the latter being fast on the shaft 120 of the roller 76. The cams 82 and 97 for lifting and lowering the roller and holding-blocks are located on the shaft 112, and the wing-actuating cam 104 is located on the sleeve 19.

To prevent the sheet of paper from shifting or twisting when withdrawn, a cross-rod 125 is provided with hangers formed in sections 126 and 127, respectively. The section 126



of each hanger is provided with a slot 128 and the section 127 with a bolt 129, fitting the slot, and a holding-plate 130, engaging the opposing surface of the section 126. The bolt is flattened or squared, so that it will not turn, but will hold the sections together, while permitting them to slide loosely upon each other in conformity with the adjustment of the platform. In use the hangers are adjusted on the rod 125 into contact with the sides of the package of paper and with the lower end of the sections 127 resting on the platform 1. As the paper is withdrawn the platform is adjusted vertically by means shown and described in said former application or by any other suitable mechanism, and the lower sections 127 of the hangers will slide upon the upper sections in conformity with the movement of the platform. In said former application I explained mechanism for actuating the friction feed-roller 10 into contact with the paper, first with a delicate and then with a gradually-increasing pressure, whereby the sheet is started by an action analogous to the manual operation of removing a sheet by the friction of a finger on its upper surface. I find, however, that in actual use it is necessary to vary the time of contact of the roller 10, as some sheets start slowly, while others slip easily on the surface of the remaining sheets. For this reason I have provided the roller-raising arm 30 with a bracket 130, Fig. 8, in which is journaled a screw-threaded swivel-bolt 131, provided with a feed-nut 132, the latter being guided by the bracket and moved vertically by turning the bolt 131. The stud 31 projects from the feed-nut in a position to engage the roller-actuating arm 30, and by adjusting the feed-nut the interval of roller contact may be varied in accordance with the quality of paper. The interval is increased for heavy or rough-surfaced paper and decreased for light or smooth-surfaced paper, which slips easily and would otherwise be discharged prematurely by the feed-roller through the space between the rollers 6 and 7.

In operation the paper is placed upon the platform, which is then manually adjusted to bring the upper surface of the package to a plane slightly below the upper edge of the guard-wing 4 when the latter is in its vertical position. The roller-actuating mechanism is then set in motion, whereupon the sheets are successively separated and discharged at regular intervals. For example, assuming that the parts are in the position shown in Fig. 9 and the machine in operation it will be observed that one of the sheets is being pushed between the rollers 6 and 7, the guard-wing being tilted to facilitate its discharge and the holding-blocks 90 being in contact with the remaining sheets and tending to hold them in position. The roller 10 is lifted and the roller 7 lowered onto the surface of the roller 6, when

the sheet is drawn off. Simultaneously with this movement the bar 85 moves downwardly into contact with the remaining sheets, the blocks 90 are lifted, and the roller 76 then moves into contact with the paper between the adjacent edges and the bar 85 in such close proximity to the edge of the top sheet as to readily draw in the sheet and cause it to double to the position in which it is shown in Fig. 9, when the roller and bar are lifted, carrying with them the doubled sheet, the continued revolutions of the roller serving to push up the end of the lifted sheet by frictional contact until the edge is carried over and passed above the roller to the position in which it is indicated by dotted lines in said figure. This provision of means for lifting the sheet with the roller and bar is of the utmost importance, as otherwise the sheet would straighten out upon the pile to its original position as soon as the pressure was removed; but by lifting the sheet in the manner described it is held separate from the lower sheets at the instant the roller 10 comes in contact with it, and the frictional resistance to the action of the latter is reduced to a minimum. As soon as the sheet is started the edge drops from the roller 76 and a wave of air travels under the moving sheet toward the roller 10, thus also preventing friction on the under sheets. At the same time the sheet is positively engaged by the withdrawing-rollers as soon as it drops from the roller 76. The roller 76 and bar 85 are so adjusted with reference to each other that when these parts are lifted the resistance and friction of the sheet on the roller and bar will just be sufficient to insure its retention as against its own weight. It is therefore obvious that the sheet so supported will offer practically no resistance to the action of the feed-roller in withdrawing the sheet. This arrangement is of great importance, as the sheet-separating roller and bar are not only used to individualize the top sheet, but are made to coöperate with the feed-roller in the withdrawal of the sheet by reducing to a minimum the friction necessary to be overcome by the feed-roller. As the latter is rapidly revolved and is moved toward the paper by a positive movement it starts the sheet at the instant of contact, and thus avoids rubbing or marring the sheet, as frequently results where the frictional contact of the top sheet upon the pile is not reduced. I thus accomplish by simple and inexpensive mechanism a much more effectual reduction of friction between the sheets than can be attained by the use of expensive air-blast or suction devices such as have heretofore been usually employed for this purpose. As soon as the sheet is started the guard-wing 4 is moved to a vertical position, thus coöperating with the blocks 90 in holding the remaining paper. The wing is found especially serviceable where the sheets tend to adhere strongly to each other, as the



positive operation of the delivery-rollers 6 and 7 will in some cases pull the under sheets from beneath the blocks 90.

I attach great importance to the provision of means, such as the rack-bars 73, for adjusting the sheet-separating mechanism longitudinally of the line of feed, for I am thus enabled to locate the sheet-separating roller 76 in such proximity to the edge of the sheet that it can be drawn up and caused to pass above such roller. With this construction the continued movement of the roller after the sheet is lifted will not tear or injure the paper, as the latter is permitted to rest lightly on the upper surface of the roller. A further advantage also exists in the fact that the edge of the paper is permitted to spring backwardly before either the roller 76 or bar 85 is raised, and there is therefore no tendency for the sheet to become disarranged in position by the reaction of the doubled sheet. By adjusting the bar 85 to a greater or less distance from the roller 76 sheets of any ordinary weight or thickness may be caused to double and pass over the roller 76, as above explained.

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

1. In a device of the described class, the combination with a supporting platform or table; of sheet-withdrawing mechanism operative near one edge of the pile of sheets; means for intermittently compressing the paper along a line near the opposite edge of the pile; a revolving sheet-separating roller surfaced annularly with bands of frictional material and extending across the pile, parallel with the edge of the sheets and the line of compression; and means for reciprocating the separating-roller into and out of contact with the paper, in synchronism with the compressing mechanism, and in alternation with the action of the sheet-withdrawing mechanism, said sheet-separating roller being located in such relation to the edge of the pile and the line of compression, as to draw in the edge of the top sheet and cause the same to double and pass above the roller, and be lifted with it.
2. In a device of the described class, the combination with sheet-withdrawing mechanism; of means for intermittently compressing the paper along a line near the edge opposite the point of delivery; a revolving sheet-separating roller; and means for intermittently bringing the same into contact with the paper between said line of compression and the adjacent edge of the sheet, said roller being actuated synchronously with the compression mechanism and in alternation with the sheet-withdrawing mechanism, and said roller being located in such proximity to the edge of the sheet and the line of compression, that the friction of the roller will cause the sheet

to double and pass above the roller, prior to the removal of the compression.

3. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a bar located near one edge of the sheets, and extending across the pile from one side to the other, parallel with the edge; a friction-roller extending across the sheets, parallel with the bar, and between it and the adjacent edge of the sheets; means for reciprocating the rollers and bar into and out of contact with the sheets; and means for rotating the roller in a direction to push the sheets toward the bar, the bar and roller being located in such relation to each other and the adjacent edge of the sheets, as to cause the sheets to be doubled between the roller and bar, and held by frictional contact when the roller and bar are lifted.

4. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; and means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them and be held by frictional contact when the roller and bar are lifted.

5. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; and means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them, and be held by frictional contact when the roller and bar are lifted; together with means for adjusting the bar and roller with reference to each other.

6. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; and means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them, and be held by frictional contact when the roller and bar are lifted; together with means for adjusting the bar and roller with reference to each other, and jointly with reference to the sheets.

7. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and



parallel therewith; means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them, and be held by frictional contact when the roller and bar are lifted; a common support for the bar and roller; and means for adjusting the same longitudinally.

8. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; and means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them and be held by frictional contact when the roller and bar are lifted; together with holding devices for engaging the under sheets when the roller and bar are lifted.

9. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; and means for reciprocating the roller and bar into and out of contact with the paper; said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them, and be held by frictional contact when the roller and bar are lifted; together with sheet-withdrawing mechanism, operative upon the pile at a side opposite that occupied by said roller and bar.

10. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; and means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to double between them, and be held by frictional contact when the roller and bar are lifted; together with a friction feed-roller parallel to the bar, and operative at the other end of the pile.

11. In a device of the described class, the combination with sheet supporting and withdrawing mechanism; of a friction-roller and bar located near one edge of the sheets, and parallel therewith; means for reciprocating the roller and bar into and out of contact with the paper, said roller being revolved in a direction to push the sheets toward the bar, and the bar and roller being located in such relation to each other as to cause the sheet to

double between them, and be held by frictional contact when the roller and bar are lifted; together with a friction feed-roller, operative to start the sheets when lifted; and sheet-withdrawing rollers arranged to positively engage the sheets between them when started by the feed-roller, and dropped by the sheet-separating roller.

12. In a device of the described class, the combination of a paper-supporting platform; a transverse paper-compressing bar connected by suitable arms with a point of pivotal oscillation; a friction-roller, parallel with the compression-bar, and also connected by supporting-arms with a point of pivotal oscillation; an actuating-shaft, and connections for rotating the roller; a cam mounted on the shaft; a projection from one of the roller-supporting arms having a bearing on the eccentric periphery of the cam, and a projection on one of the roller-supporting arms, whereby, as said cam is rotated, the bar and roller are oscillated into and out of contact with the surface of the paper.

13. In a device of the described class, the combination of a paper-supporting platform; a transverse paper-compressing bar connected by suitable arms with a point of pivotal oscillation; a friction-roller, parallel with the compression-bar, and also connected by supporting-arms with a point of pivotal oscillation; an actuating-shaft and connections for rotating the roller; a cam mounted on said shaft; a projection from one of the roller-supporting arms, having a bearing on the eccentric periphery of the cam, and a projection on one of the roller-supporting arms, whereby, as said cam is rotated, the bar and roller are oscillated into and out of contact with the surface of the paper; together with paper-holding devices, provided with similar cam-actuated connections, and arranged to engage the paper between the separating-roller and the adjacent edge of the sheet.

14. In a device of the described class, the combination of a paper-supporting platform; a compression-bar located for operation near one edge of the sheets of paper supported by the platform; a separating-roller, coöperative with the compression-bar and extending parallel thereto between the bar and one edge of the sheet; means for rotating the separating-roller; means for lifting and depressing the roller and bar in synchronism; a rotary feed-roller; and means for reciprocating the same into and out of contact with the paper, in alternation with the movement of the separating-roller, said separating-roller and feed-roller being formed with annular frictional surfaces adapted for continuous frictional operation upon the paper with which the roller contacts.

15. In a device of the described class, the combination of a paper-supporting platform;



a compression-bar located for operation near one edge of the sheets of paper, supported by the platform; a separating-roller surfaced annularly with frictional material and extending parallel to the bar between the latter and the adjacent edge of the pile of sheets; continuously-acting roller-rotating mechanism; means for lifting and depressing the roller and bar in synchronism, said roller and bar being adjusted in proximity, with sufficient space between them to permit the sheet to double upwardly in the form of a loop, whereby the paper will engage resiliently with the roller and bar and be carried with them when the latter are lifted.

16. In a device of the described class, the combination of a paper-supporting platform; a compression-bar located for operation near one edge of the sheets of paper supported by the platform; a separating-roller, coöperative with the compression-bar and extending parallel thereto between the bar and one edge of the sheet; means for rotating the separating-roller; means for lifting and depressing the roller and bar in synchronism; a rotary feed-roller; and means for reciprocating the same into and out of contact with the paper in alternation with the movement of the separating-roller; together with a set of rotary delivery-rollers, adapted to receive the sheets advanced by the feed-roller; and means for

separating the delivery-rollers while the sheet is being so advanced.

17. In a device of the described class, the combination of a paper-supporting platform; a compression-bar located for operation near one edge of the sheets of paper supported by the platform; a separating-roller, coöperative with the compression-bar, and extending parallel thereto between the bar and one edge of the sheet; means for rotating the separating-roller; means for lifting and depressing the roller and bar in synchronism; a rotary feed-roller; means for reciprocating the same into and out of contact with the paper, in alternation with the movement of the separating-roller; together with a set of delivery-rollers adapted to engage and withdraw the sheets advanced by the feed-rollers; and an oscillatory guard-wing, adapted to be adjusted in one direction to facilitate the passage of paper advanced by the feed-roller, and in another direction to hold back the remaining paper while the advanced sheet is being withdrawn by the delivery-rollers.

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

FRANK SCHILZ.

Witnesses:

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JAS. B. ERWIN.