No. 684,771. Patented Oct. 15, 1901.

F. SCHILZ.

PAPER FEEDING DEVICE.

(Application filed Sept. 23, 1899.)

(No Model.) 5 Sheets—Sheet 1.

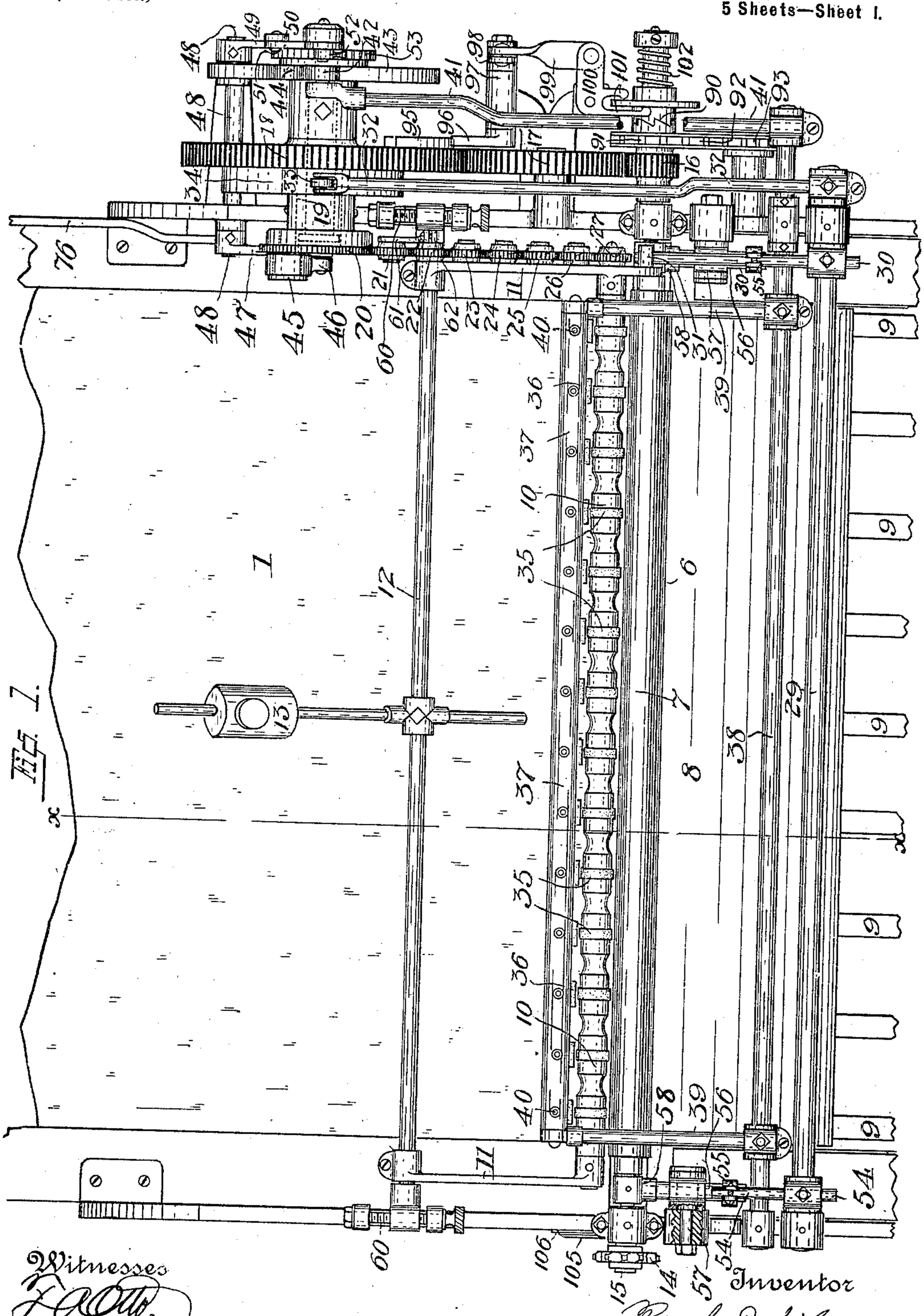

Fig. 1.

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PAPER FEEDING DEVICE.

(Application filed Sept. 23, 1899.)

(No Model.) 5 Sheets—Sheet 2.

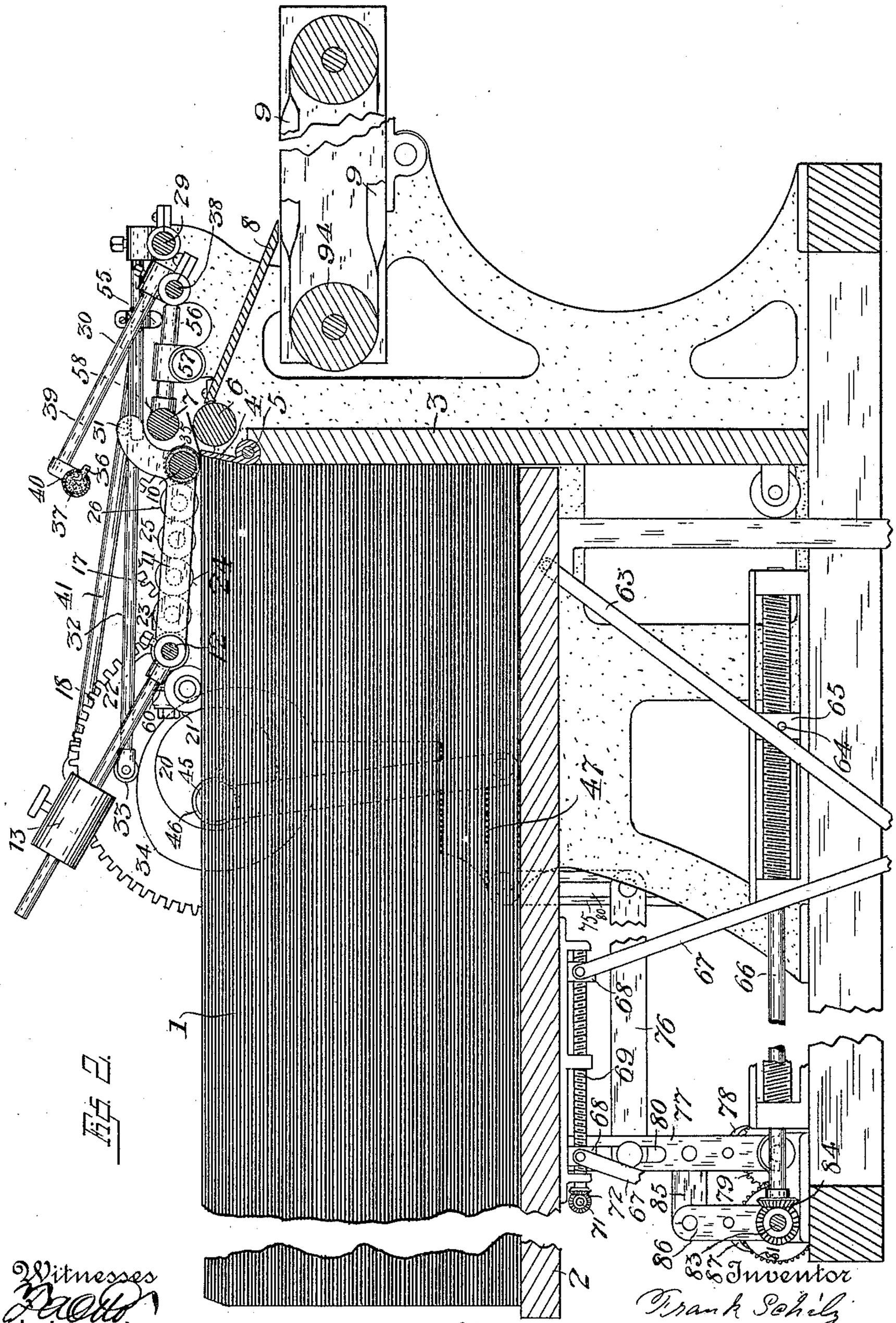

Fig. 2.

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(Application filed Sept. 23, 1899.)

(No Model.) 5 Sheets—Sheet 3.

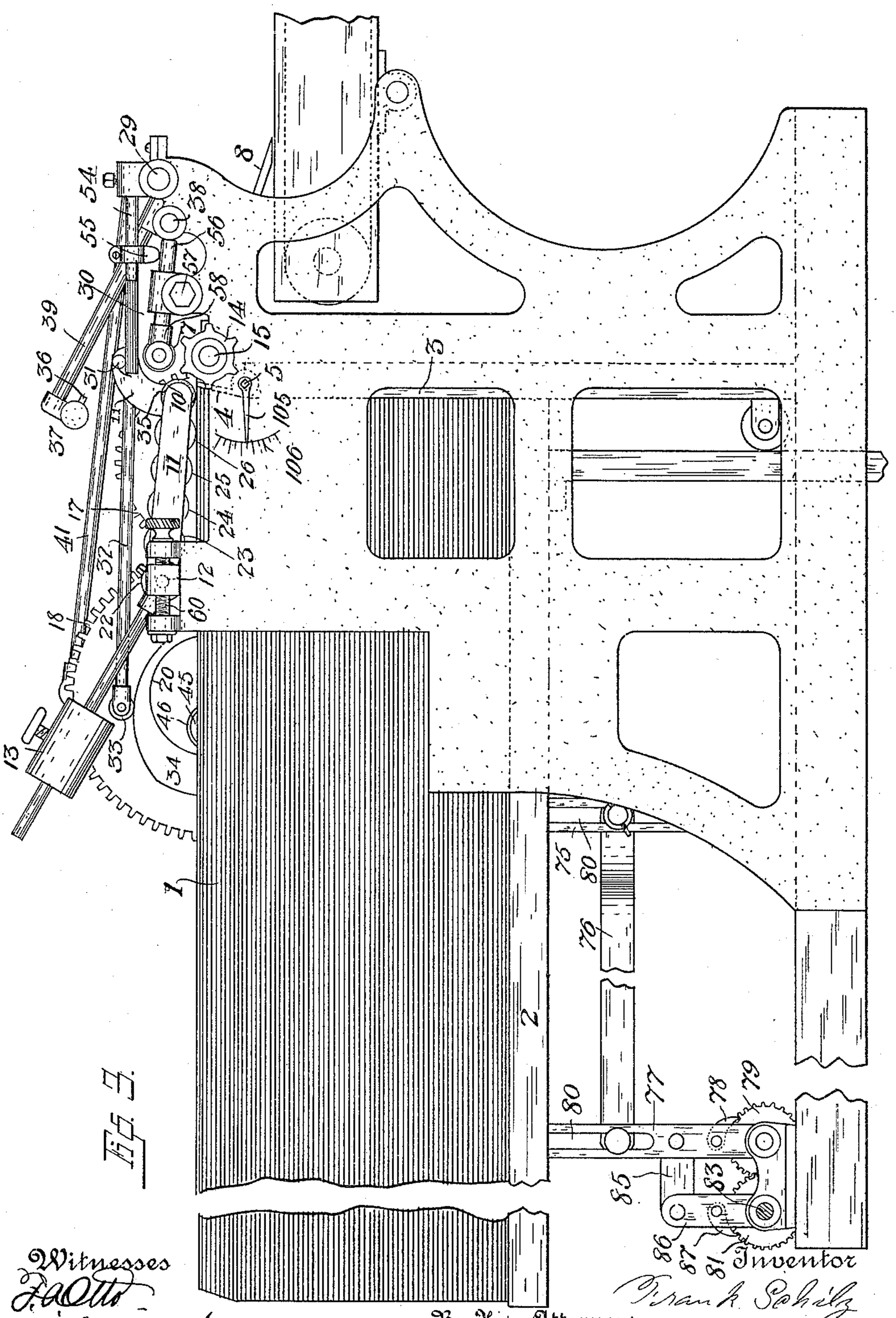

Fig. 4.

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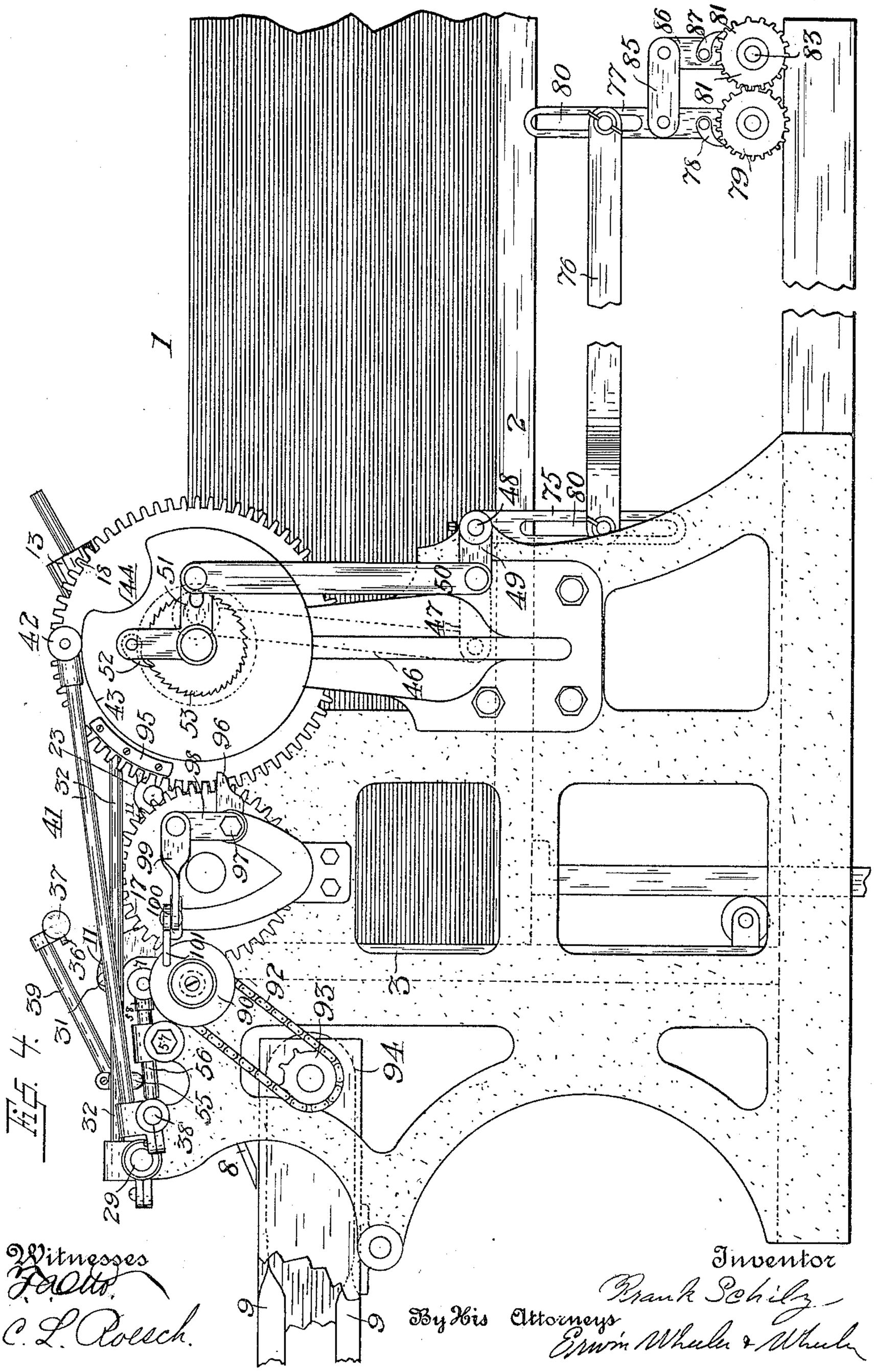
(Application filed Sept. 23, 1899.)

(No Model.) 5 Sheets—Sheet 4.



Witnesses
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No. 684,771. Patented Oct. 15, 1901.

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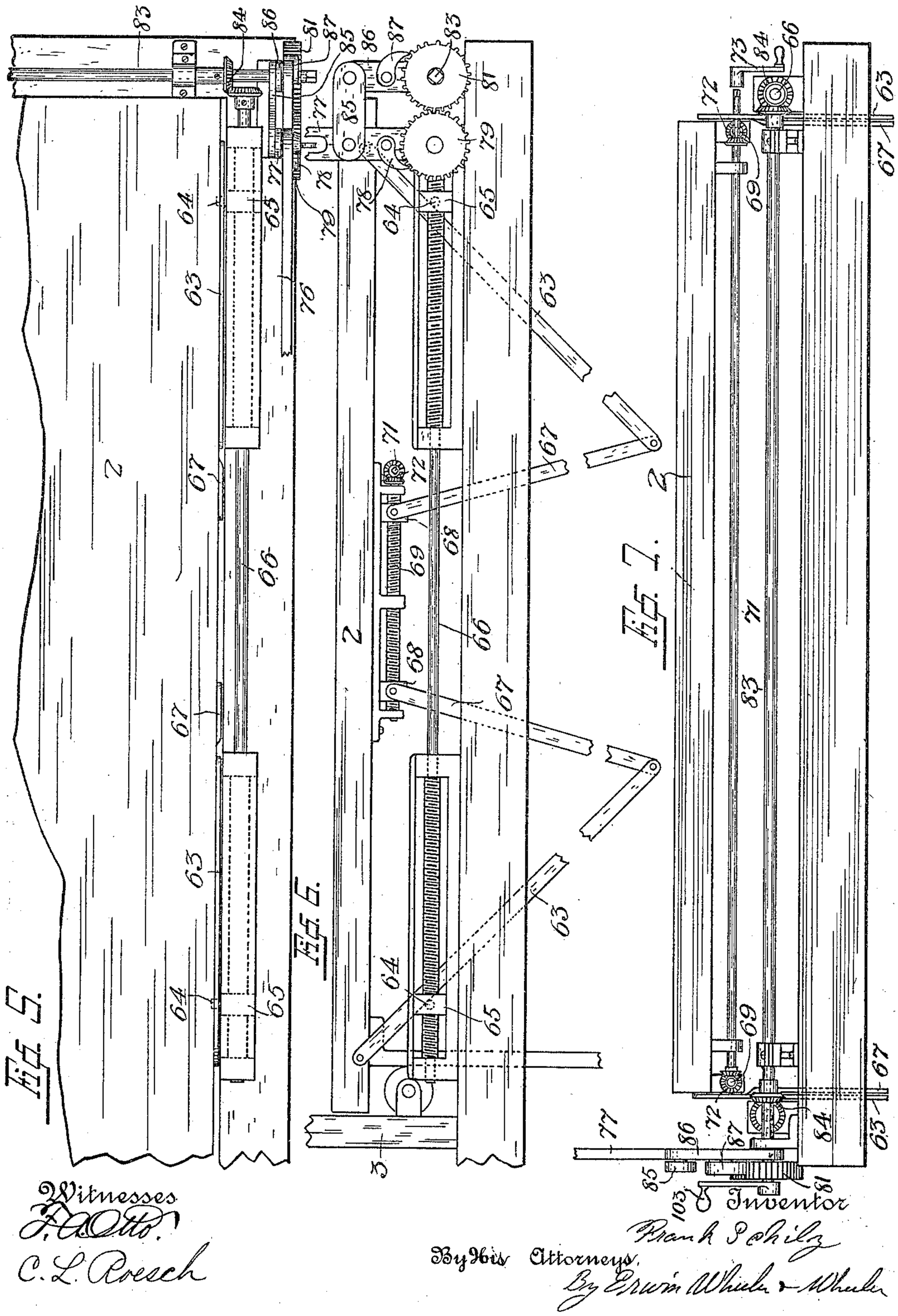
PAPER FEEDING DEVICE.

(Application filed Sept. 23, 1899.)

(No Model.) 5 Sheets—Sheet 5.



Witnesses
F. D. Otto.
C. L. Roesch

Inventor
Frank Schilz
By His Attorneys,
By Erwin Whiteley Wheeler

UNITED STATES PATENT OFFICE.

FRANK SCHILZ, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO HUGO LOEWENBACH, OF SAME PLACE.

PAPER-FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 684,771, dated October 15, 1901.

Application filed September 23, 1899. Serial No. 731,405. (No model.)

To all whom it may concern:

Be it known that I, FRANK SCHILZ, a citizen of the United States, residing at Milwaukee, in the 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.

The object of my invention is to provide means for feeding paper from a package in single sheets at regular intervals and without injury to the surface of the paper or to the printed matter thereon.

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

Figure 1 is a plan view of my invention with the rear portion of the feed-platform broken away. Fig. 2 is a sectional view drawn on line *x x* of Fig. 1. Fig. 3 is an elevation of my invention as seen from the left-hand side. Fig. 4 is an elevation of the same as seen from the right-hand side. Fig. 5 is a detail top view of a portion of the actuating mechanism for lifting the feed-platform. Fig. 6 is a detail side view of the same. Fig. 7 is a rear view of said mechanism.

Like parts are identified by the same reference characters throughout the several views.

The package of paper 1 is placed upon a vertically-movable feed-platform 2 with the front end of the package against the vertical wall 3. Along the upper edge of the wall 3 I have provided an adjustable guard-wing 4, supported by a rod 5 in such a manner that the wing constitutes an extension of the wall and may be adjusted at various angles to regulate the discharge of the sheets of paper over the same. The sheets are successively pushed over the upper edge of the guard-wing 4 by mechanism hereinafter explained and are received between rollers 6 and 7, by means of which the sheets are withdrawn from the package and discharged over an inclined platform 8 upon the tapes 9, forming part of a conveyer, which carries the sheets to the feed-rolls of the printing or ruling machine with which my device is usually connected.

A frictional discharge-roller 10 is supported upon oscillating arms or bars 11 and intermittently brought into contact with the surface of the upper sheet to push the same forwardly into a position to be engaged by the rollers 6 and 7. It will be observed, Fig. 2, that as the sheet of paper is thus pushed forwardly by the friction-roller 10 the roller 7 is lifted out of contact with the roller 6, so as to permit the sheet of paper to pass freely between these rollers. After the front end or edge of the sheet has been entered between these rollers, however, the roller 7 is depressed and engages the sheet between it and the roller 6, when the sheet is drawn off from the package by the action of the rollers 6 and 7 and independently of the roller 10, which latter roller is lifted out of contact with the paper simultaneously with the depression of the roller 7 into contact therewith. In order that the package of paper may always be kept in a position to permit the discharge of the upper sheet over the wing 4, I have provided mechanism, which will be hereinafter explained, for slowly and continuously lifting the platform 2 during the operation of the machine. The upward movement of the platform is arranged to correspond closely with the thickness of the paper discharged, so that the upper surface of the package is uniformly maintained at the same level regardless of the number of sheets remaining.

Referring now more particularly to the supporting and actuating mechanism of the various parts, it will be observed, Fig. 1, that the discharge-roller 10 is supported from a rod 12 by means of the arms 11, heretofore referred to, an adjustable counterbalance 13 being employed to relieve the pressure of the roller 10 and its actuating mechanism upon the paper. The counterbalance 13 is so adjusted that the pressure of the roller 10 is very light, especially when feeding thin paper.

Motion is communicated to the machine from the source of power through a sprocket-wheel 14, located on the extended end of the shaft 15 of the roller 6. From the shaft 15 motion is communicated to the roller 10, Fig. 1, through the gear-wheels 16, 17, and 18, sleeve 19, and chain of gears 20 to 27, inclusive, the gear-wheel 27 being secured to one

end of the shaft of the roller 10. The roller 7 runs idle, motion being communicated to it by frictional contact with the roller 6 or the paper interposed between the rollers.

In order to lift the roller 10 out of contact with the paper, I have provided a cross-rod 29, having an arm 30, adapted to engage underneath a stud 31, projecting laterally from the arm 11, which supports the actuating-gearing of the friction-roller 10. The rod 29 is also provided with an arm 32, the free end of which carries an antifriction-roller 33, which bears upon the eccentric periphery of a cam 34, rigidly secured to the gear-wheel 18. As the friction wheel or roller 33 and arm 32 are lifted by the cam 34 the rod 29 is oscillated to lift the roller 10 out of contact with the paper through the medium of the arm 30, stud 31, and arm 11. On the other hand, when the antifriction-roller 33 bears upon the short radius of the cam 34 the support of the arms 30 is removed from the stud 31 and arm 11. The friction-roller 10 then drops by gravity and contacts lightly with the upper sheet of the package, when the rotary movement of the roller causes such sheet to move forwardly from the pack until it is entered between the rollers 6 and 7.

Owing to the fact that the sheets in the pack are not subjected to pressure, it requires but a light touch to individualize the upper sheet, and as the roller 10 revolves rapidly a very light contact with the paper is sufficient for my purpose. Hence there is no possibility of rubbing and damaging the paper, such as occurs when the paper is forcibly engaged between a frictional discharge-roller and a pressing device, such as is usually employed in this class of machines.

It will be observed that the body of the roller 10 does not contact with the paper, but that the roller is provided with a series of bands or friction-belts 35. These are preferably of rubber, which is kept clean and in a condition with its frictional properties at a maximum by means of cleansing-pads 36, carried by a pipe 37, which is supported from a cross-rod 38 by means of arms 39. The pipe 37 is filled with a porous substance, such as felt or similar material, which is kept saturated with alcohol or an equivalent cleansing liquid capable of penetrating the pads 36. Apertures 40 are provided in the pipe or tube 37, by means of which the cleansing liquid may be poured into the tube. The tube 37 is held in a position with the pads 36 normally out of contact with the frictional bands or belts 35 by means of an arm 41, secured to the rod 38 and provided with the friction-wheel 42, which bears upon the surface of a cam-disk 43. When the friction-wheel 42 registers with the recess or depression 44 in the cam 43, the arm 41 is permitted to rock downwardly, and the tube 37 also descends correspondingly into such a position that when the roller 10 is in its raised position the bands 35 will rotate in contact with the pads 36 and be cleansed thereby, the effect of the alcohol and the frictional contact with the pads being to remove the fibrous substance from the surface of the rubber and restore its frictional properties to a maximum. The continued movement of the cam 43 carries the depression 44 past the friction-wheel 42, when the latter, together with the arm 41, is again lifted and a corresponding movement communicated to the tube 37, whereby the latter is lifted out of contact with the bands 35 of the roller 10. A slow movement is communicated to the cam 43 from the sleeve 19, Figs. 1 and 4, through the gear-wheel 20, crank-pin 45, connecting-rod 46, arm 47, rock-shaft 48, arm 49, connecting-rod 50, elbow-lever 51, pawl 52, and ratchet 53, the latter being fast on the cam 43.

It will be observed, Fig. 1, that the cross-rod 29 is also provided with an arm 54, located at the other side of the machine from the lifting-arm 30. The arms 54 and 30 are each provided with a downwardly-projecting pin 55, Fig. 2. When the arms are depressed, these pins bear upon levers 56, which are fulcrumed at 57 and secured to the bearings 58 of the roller 7. The weight of the arms 32, 30, and 54 is such that when cam 34 permits the arm 32 to move downwardly motion will be communicated through the pins 55 and levers 56 to lift the roller 7 out of contact with the roller 6 simultaneously with the depression of the roller 10, thus permitting the paper actuated by the latter to freely enter the space between the rollers 6 and 7, as illustrated in Fig. 2. As soon, however, as the cam 34 lifts the arm 32 and oscillates the rod 29 to also lift the arms 30 and 54 the roller 7 again drops by gravity into contact with the roller 6 or upon the interposed sheet of paper.

It will be observed, Fig. 2, that the package of paper is adjusted with its upper surface slightly below the upper edge of the wing 4. This is desirable in order to prevent the feeding of more than a single sheet at a time. The upper sheet when subjected to the friction of the roller 10 bends upwardly at its front edge and passes over the wing, while the remaining sheets are detained thereby, and as the roller 10 is lifted as soon as the upper sheet has been started there is practically no tendency to start the lower sheets. Where thick, heavy, or stiff paper is to be fed, however, it is desirable that the roller 10 should be moved backwardly to a greater distance from the wing than when feeding thin or flexible paper. I have therefore supported the roller-supporting cross-rod 12 upon adjusting-screws 60, whereby this rod and the roller may be adjusted to the front or rear, as desired.

The gear-wheel 21 is supported from an adjustable arm 61, which is secured to the machine-frame by a clamp 62. By releasing the clamp the gear-wheel can be adjusted to

compensate for the longitudinal movement of the roller-supporting arms 11 as the roller 10 is adjusted to the front or rear.

Referring now to the mechanism for supporting and actuating the feed-table 2, it will be observed, Figs. 2 and 6, that the same is provided with angularly-extending bars 63, which are arranged to bear upon pins 64, projecting from feed-nuts 65, located on the screw-shafts 66. Each of the bars 63 is held at the desired angle by a link 67, secured to its lower end and connected with a nut 68 on a screw-shaft 69, which is journaled in suitable bearings on the under side of the feed-table. When the shafts 66 are actuated, the movement of the nuts 65 communicates a vertical movement to the feed-table through the pins 64 and bars 63, the speed of the movement thus communicated being regulated by the angle at which the bars 63 are held by the links 67. This angle is slowly changed and an extremely nice adjustment of the bars 63 effected by turning the screw-shafts 69 to move the upper ends of the links 67 backwardly or forwardly along the under side of the feed-table. In the construction shown there are two bars 63 on each side of the feed-table, with links connected to nuts upon the single screw-shaft 69, upon which right and left screw-threads are provided at the respective ends. The shafts 69 are connected by a cross-shaft 71, Fig. 7, and bevel-gearing 72, so that all the links may be simultaneously and equally adjusted by means of a crank 73, applied to the projecting end of the shaft 71.

A slow feed movement is communicated to the actuating-shafts 66 from the gear-wheel 18, Fig. 1, through the sleeve 19, gear-wheel 20, crank-pin 45, connecting-rod 46, arm 47, Fig. 4, rock-shaft 48, arm 75, connecting-rod 76, arm 77, pawl 78, ratchet or gear wheel 79, and gear-wheel 81, cross-shaft 83, and bevel-gears 84, Figs. 5 and 6. The motion may be doubled by providing the arm 77 with a link 85, which communicates the reverse movement of the arm to the cross-shaft 83 through the lever 86, pawl 87, and gear-wheel 81, the latter being fast on the shaft 83. The movement may also be regulated by adjusting the connecting-rod 76 in the slots 80 of the arms 75 and 77, Fig. 4, to increase or diminish the stroke of the pawl-arms and pawls. The shafts 66 are thus actuated in correspondence with the movement of the paper-feeding mechanism, and the screw-blocks 65 are moved inwardly, (in the construction shown,) causing the pins 64 to slowly lift the inclined bars 63 and the feed-table 2 to correspond with the withdrawal of the paper from the package. By means of the screw-shafts 69 this movement can be made to correspond with great exactness to the thickness of the paper fed.

It will be understood that my invention is usually connected with the machine to which the paper is fed and driven therefrom and in unison therewith. For example, where my device is connected with a printing-machine it is geared to feed one sheet of paper for each revolution of the printing-cylinder. It is desired, therefore, to employ means for insuring the delivery of the paper to a position where it can be taken by the printing-cylinder of such machine at the proper time, and to accomplish this the tapes 9 are arranged to be driven at a greater speed than the roller 6 of my feeding device, and the paper carried against stops, (not shown,) such as are usually employed in connection with the feed-rolls of printing-machines. The tapes 9 are driven from the roller 6 of my feeding device through the medium of the clutch 90, loose sprocket-wheel 91, Fig. 1, chain 92, sprocket-wheel 93, and tape-actuating roller 94, the roller 94 being larger than the roller 6, and therefore actuating the tapes at a higher speed. In order to prevent the paper from being wrinkled by the friction of the tapes after the sheet has been carried into contact with the feed-stop of the printing-machine, I have provided means for disengaging the clutch 90 and permitting the tapes to come to rest at such times. To accomplish this, the gear-wheel 18 is provided with a raised flange 95, which is adapted to contact with a lever 96, and thus communicate motion to disengage the clutch 90 through said lever 96, rocking shaft 97, arm 98, link 99, and elbow-lever 100, one arm of the latter being provided with the clutch-actuating fork 101. As soon as the flange 95 has moved past the lever 96 the clutch is reëngaged by a spring 102, and the tapes are thus again set in motion. It will be understood that by reason of the comparatively rapid movement of the tapes the sheets of paper are carried against the stops and allowed to rest there for a short interval before they are received by the printing-machine and before the arrival of the next succeeding sheets.

Briefly reviewing the operation of my device, the pack of paper 1 is first placed upon the feed-platform, the latter being then adjusted at the proper height by means of a crank 103 applied to the cross-shaft 83. The screw-shafts 69 are then actuated by adjusting the angle of the bars 63, the extent of the required adjustment being easily ascertained where the length of the bars and links, the pitch of the screw-threads on the shaft 69, and the number of sheets of paper taken for each vertical inch are known. For commercial use a table can be prepared showing the required adjustments for various thicknesses of paper. The wing 4 is then adjusted to correspond with the quality and thickness of the paper used, the proper adjustment being facilitated by means of a pointer 105, secured to the wing-supporting rod or shaft, and a gage or dial 106, the latter being indexed to designate the various grades of paper at the

point of adjustment for such paper. The adjustment having been effected, the machine runs automatically until the supply of paper on the slowly-rising feed-table is exhausted.

I am aware of the fact that means have heretofore been devised for lifting intermittingly-revolving friction-rollers out of contact with the surface of the paper in the interval of rest in order that such rollers will not interfere with the withdrawal of the individualized sheet; but such devices do not involve the same principle of operation as that of my invention, in which a continuously-revolving friction-roller is reciprocated into and out of contact with the surface of the paper to be fed, moving gradually into and out of contact with the paper.

In all previous devices, so far as I am aware, the pressure and weight of the friction-roller at the time the sheet is individualized is exerted upon the paper, thereby increasing the frictional resistance between such sheet of paper and the remainder of the package underneath the same. In the operation of my invention, however, the rapidly-revolving roller is brought gradually into contact with the paper, there being no pressure upon the paper at any point at the time of initial contact, and consequently practically no frictional resistance between the upper sheet of paper and the next succeeding sheet. As the roller is covered with a frictional material, such as rubber, it is obvious that the upper sheet is easily started, and having once been moved upon the sheet below the increasing pressure of the roller is easily effective to push the dislodged sheet forwardly over the guard-wing. It will be observed that this operation is much more nearly analogous to the manual act of an operator in drawing off a sheet of paper from a package by a light touch of the finger, which is in such cases moved gradually into increasing and delicate contact with the upper sheet of the package and simultaneously drawn with a quick movement in the direction in which it is desired to move the sheet. I believe I am the first to provide for the mechanical performance of this operation in the manner described, and I therefore make broad claims for the construction by means of which this function is attained. The separation of the drawing-rollers is also an important feature of my invention in that it prevents such rollers from interfering in any way with the operation of the friction or individualizing roller. The adjustable guard-wing 4 is also of great importance in holding the lower sheet, as I find that with different qualities of paper the wings should be adjusted at different angles to regulate the resistance to the movement of the sheets.

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

1. In a paper-feeding device, the combination with a suitable support for a package of paper sheets; of a continuously-revolving friction-roller; and means for moving the same gradually into and out of contact with the surface of the paper.

2. In a paper-feeding device, the combination with a suitable support for a package of paper sheets; of a continuously-revolving friction-roller; and means for moving the same gradually into and out of contact with the surface of the paper; together with a set of drawing-rollers, and means for supporting the same in the interval of contact between the friction-roller and the paper.

3. In a paper-feeding device, the combination with a suitable support for a package of paper sheets; of a continuously-revolving friction-roller; means for moving the same gradually into and out of contact with the surface of the paper; and means for regulating the resistance to the discharge with the sheet, in correspondence with the quality of the paper to be fed.

4. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper; a set of rollers adapted to receive and withdraw the individualized sheets; and a guard-wing, adapted to be adjusted at various angles, to regulate the discharge of sheets of different thicknesses and flexibility.

5. In a paper-feeding device, the combination with a suitable support for a package of paper sheets; of a continuously-revolving friction-roller; means for moving the same gradually into and out of contact with the surface of the paper; and means for regulating the resistance to the discharge with the sheet, in correspondence with the quality of the paper to be fed; together with a set of drawing-rollers, and means for separating the same in the interval of contact between the friction-roller and the paper.

6. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; means for individualizing and discharging the sheets from the platform; and a set of rollers revolving in frictional contact, and adapted to separate intermittingly to receive the individualized sheets; together with a guard-wing arranged to be adjusted at various angles to regulate the discharge of the paper between said rollers.

7. In a paper-feeding device, the combination with a suitable support for a package of paper sheets; of a continuously-revolving friction-roller; and means for moving the same gradually into and out of contact with the surface of the paper; a set of separable drawing-rollers; and means for communicating the downward movement of the friction-roller to separate the drawing-rollers.

8. In a paper-feeding device, the combina-

tion of a feed platform or table, adapted to support a package of paper thereon; a continuously-revolving friction-roller; means for reciprocating the same gradually into and out of contact with the paper; depending guides secured to the platform; feed-nuts for actuating said guides; and means for driving said feed-nuts from the source of power.

9. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a paper-retaining wall at one side of said platform; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper on the platform, and to feed the sheets successively over said wall; and means for adjusting the roller longitudinally of the line of feed.

10. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a paper-retaining wall at one side of said platform; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper on the platform, and to feed the sheets successively over said wall; means for adjusting said roller longitudinally of the line of the feed; and means for controlling the pressure of the roller upon the paper.

11. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a continuously-revolving frictional roller, actuated from the driving mechanism of the machine; an eccentric wheel connected with the driving mechanism; an oscillatory shaft having an arm bearing on the periphery of the eccentric wheel; an arm connected with said oscillatory shaft, and adapted to lift the feed-roller out of contact with the surface of the discharge-roller.

12. In a paper-feeding device, the combination with a feed platform or table; a friction-roller supported from an oscillatory shaft, and adapted to be reciprocated into and out of contact with the surface of the material on the platform; roller-actuating connections for communicating motion to said roller from the source of power; a revolving cam-disk, actuated by said connections; an oscillatory arm arranged to be actuated by the cam-disk, and to communicate an oscillatory motion to the friction-roller.

13. In a paper-feeding device, the combination with a feed platform or table; a friction-roller supported from an oscillatory shaft, and adapted to be reciprocated into and out of contact with the surface of the material on the platform; roller-actuating connections for communicating motion to said roller from the source of power; a revolving cam-disk, actuated by said connections; an oscillatory arm arranged to be actuated by the cam-disk and to communicate an oscillatory motion to the friction-roller; and a counterbalance, adapted to regulate the pressure of the roller on the paper.

14. In a paper-feeding device, the combination of a feed platform or table; a wall at one side thereof; a guard-wing located at upper edge of the wall, and adapted to be adjusted at various angles to facilitate the discharge of paper over the wall; a friction-roller adapted to be reciprocated into and out of contact with the surface of the paper on the platform; and means, coöperative with the roller-actuating mechanism, for elevating the platform.

15. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper supported on the platform; a raised guard-wing controlling the discharge of sheets from the package; and a set of rollers adapted to receive and withdraw the individualized sheets; means for lifting the upper roller of said set simultaneously with the depression of the feed-roller.

16. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper supported on the platform; a raised guard-wing controlling the discharge of sheets from the package; and a set of rollers adapted to receive and withdraw the individualized sheets; means for reciprocating the upper roller of said set alternately with the vertical movement of the feed-roller.

17. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper supported on the platform; and a pad-supporting device provided with pads, adapted to reciprocate into and out of contact with the feed-roller, to preserve its frictional properties; together with means for supplying said pads with a cleansing liquid.

18. In a paper-feeding device, the combination of a feed platform or table adapted to support a package of paper thereon; a revolving feed-roller adapted to reciprocate into and out of contact with the surface of the paper supported on the platform; a set of rollers for drawing off the sheets of paper individualized by said feed-rollers, conveyer or tapes for receiving the paper from said set of rollers; and means controlled by the actuating mechanism of the feed-roller for starting and stopping the tapes.

19. In a paper-feeding device, the combination of a feed-platform; depending bars pivotally secured thereto; adjustable links connecting the lower ends of said bars with the platform; and a feed-nut driven from the

feed mechanism of said device, and adapted to exert an angular pressure against said bars, whereby the same are actuated and the platform lifted.

20. In a paper-feeding device, the combination with a feed-platform of a set of depending bars, angularly adjusted with reference thereto; and a feed-nut driven by the actuating mechanism of the feeding device, and adapted to actuate said bars and feed-table, by angular pressure upon the bars.

In witness whereof I have hereunto set my hand and affixed my seal this 16th day of September, 1899.

FRANK SCHILZ. [L. S.]

Witnesses:

LEVERETT C. WHEELER,

F. A. OTTO.