J. KLEIDMAN.

PAPER FEEDING MACHINE.

APPLICATION FILED JAN. 24, 1918.

1,374,303.

Patented Apr. 12, 1921.

6 SHEETS—SHEET 1.

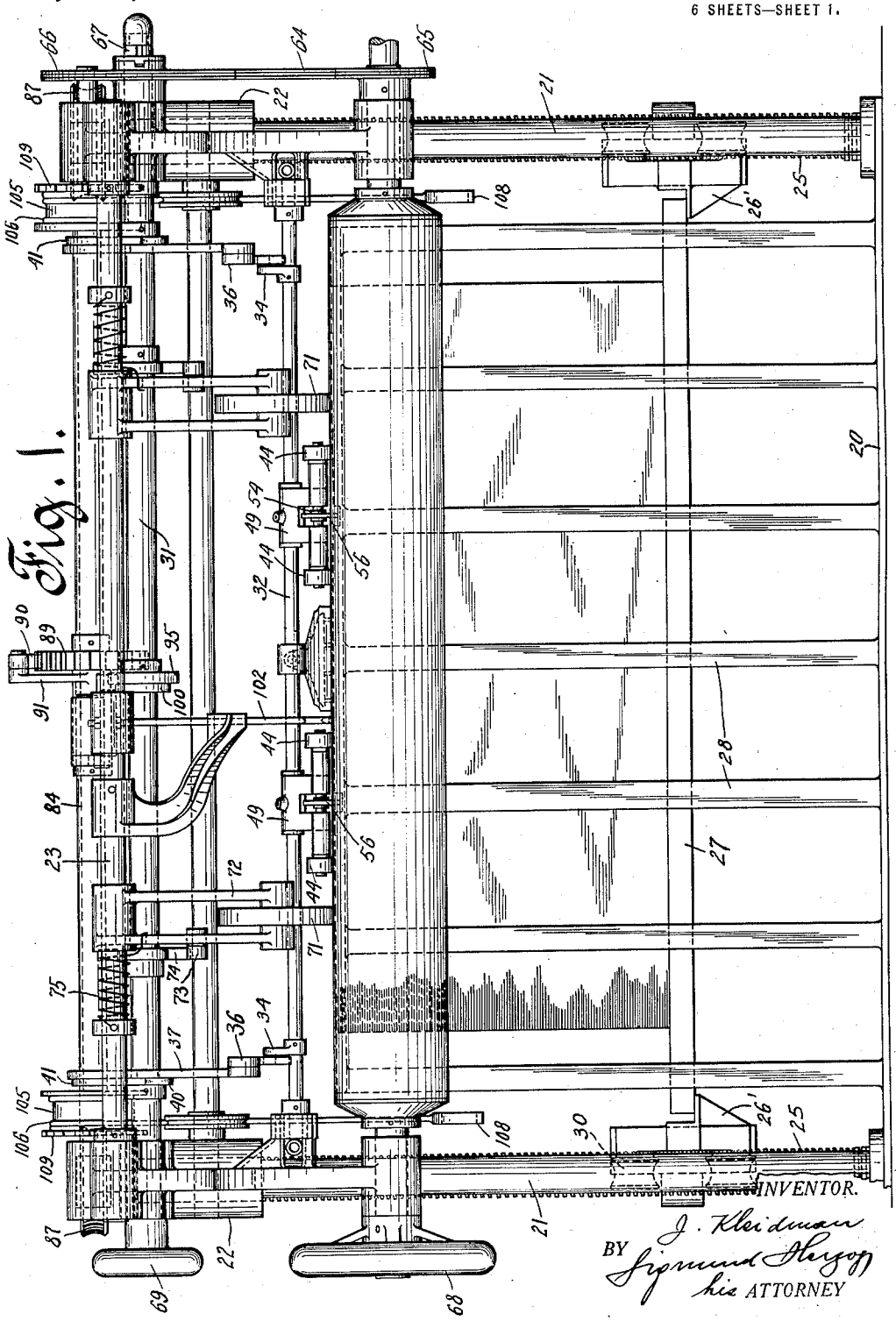


Fig. 1.

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6 SHEETS—SHEET 2.

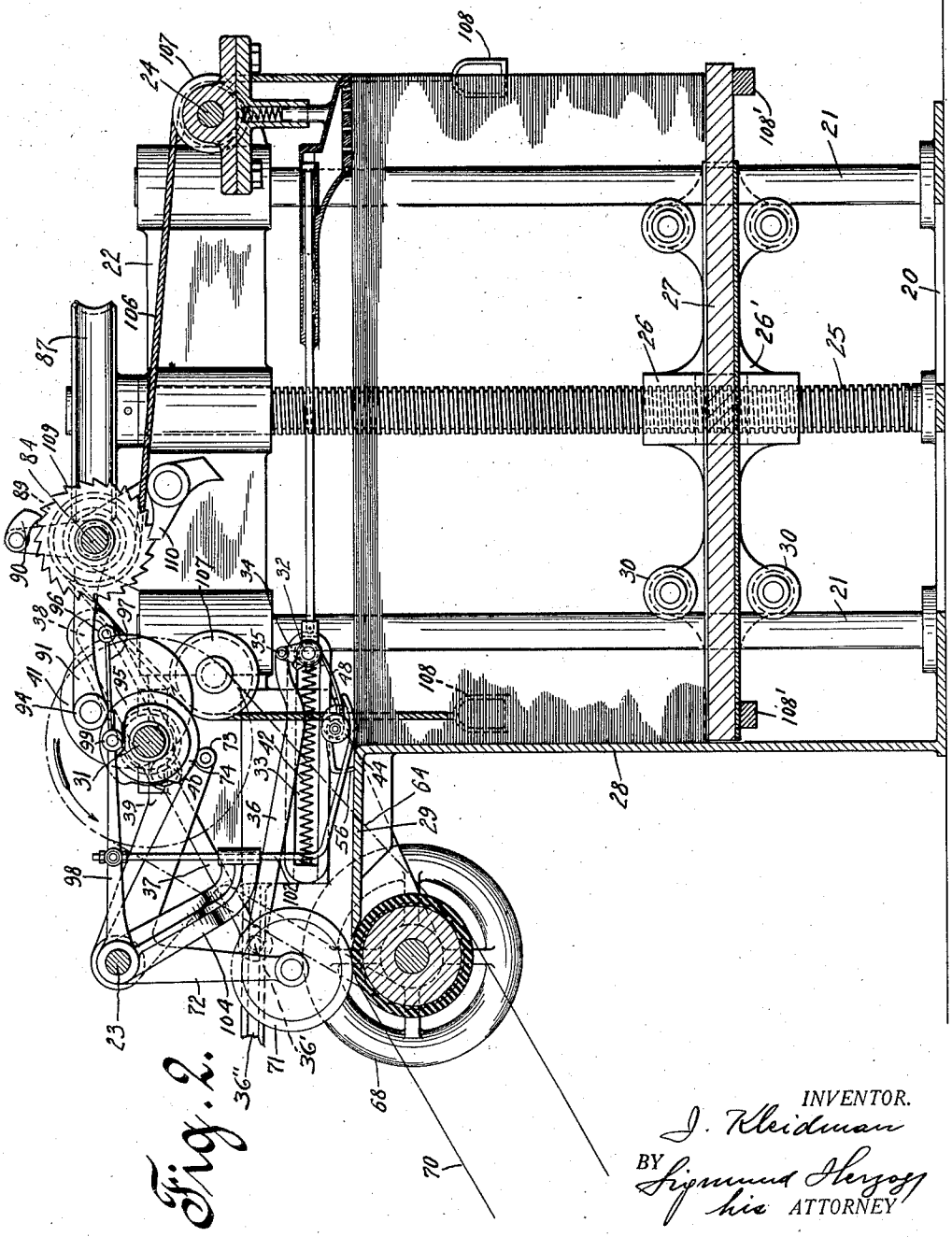


Fig. 2.

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6 SHEETS—SHEET 3.

Fig. 3.

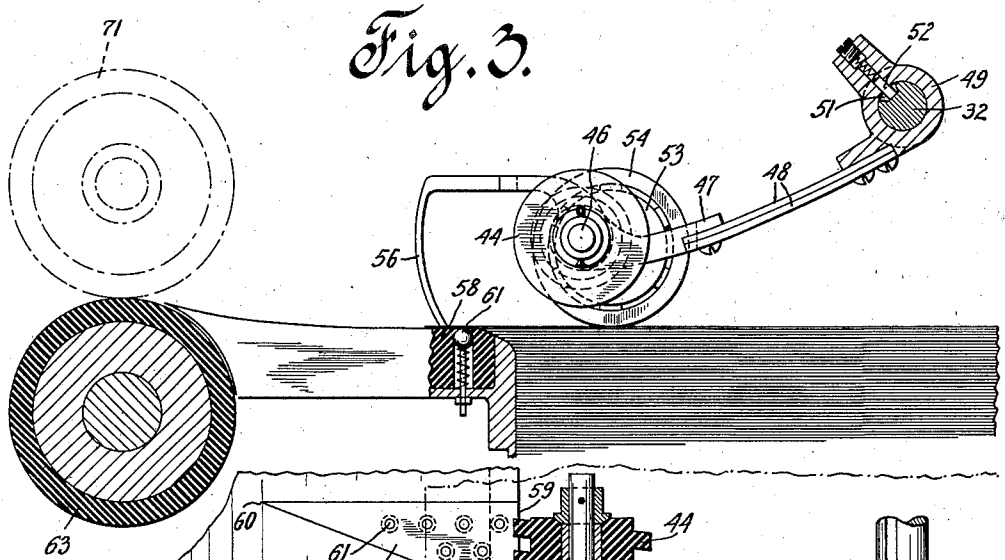
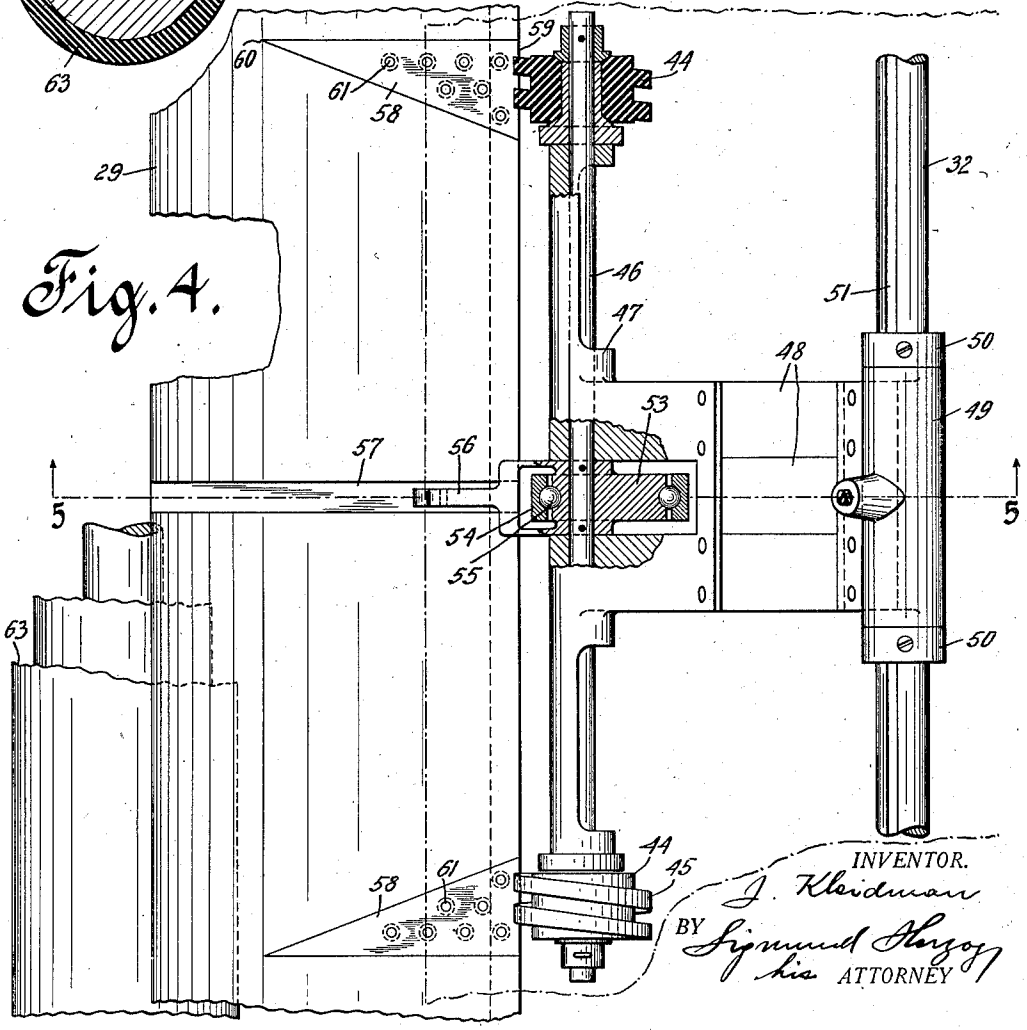


Fig. 4.



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6 SHEETS—SHEET 4.

Fig. 6.

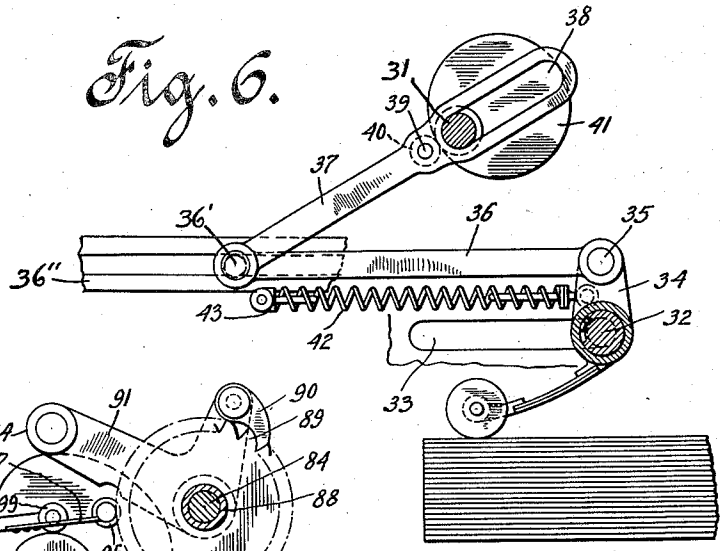


Fig. 11.

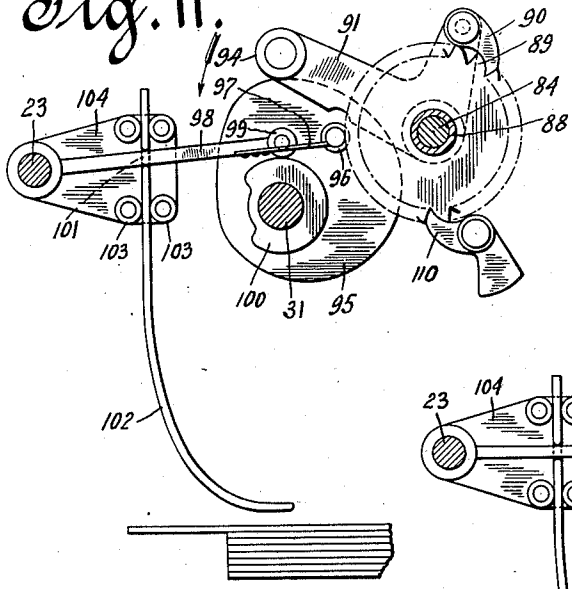


Fig. 12.

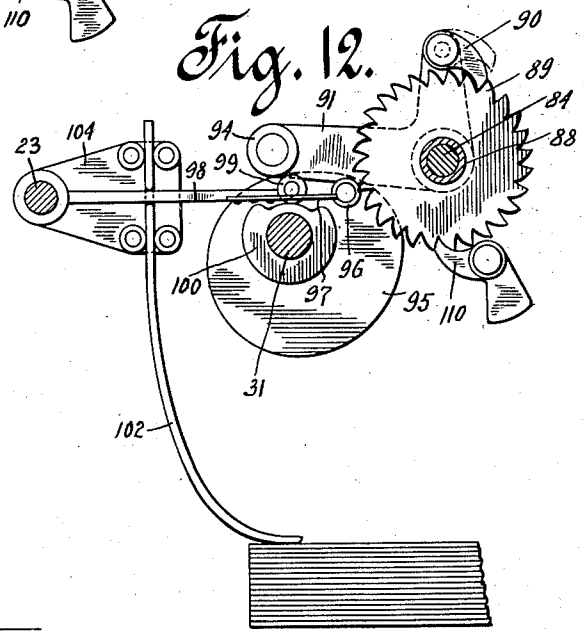
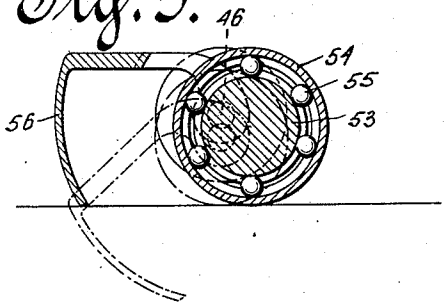


Fig. 5.



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6 SHEETS—SHEET 5.

Fig. 10.

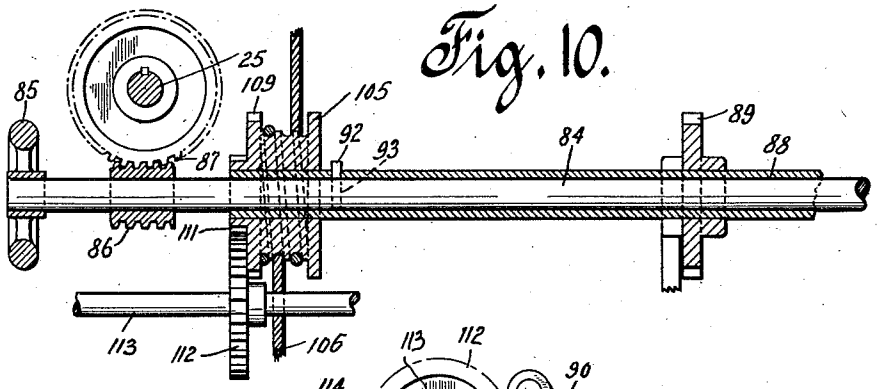


Fig. 9.

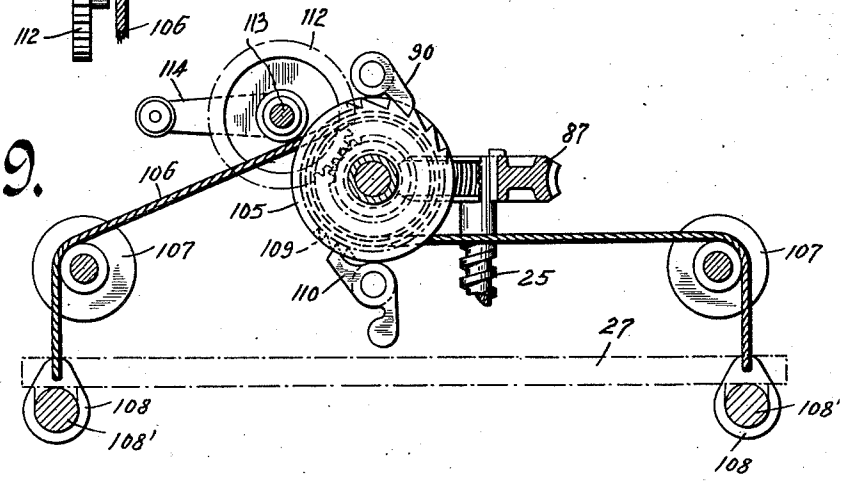


Fig. 7.

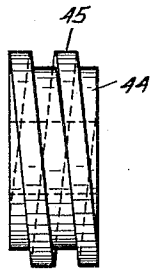


Fig. 8.

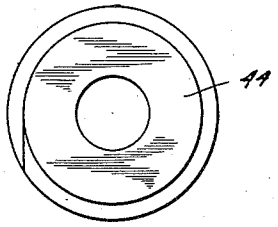


Fig. 16.

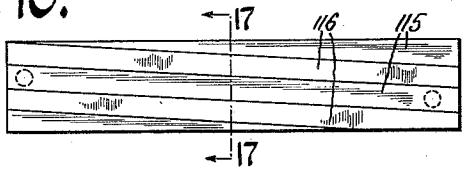
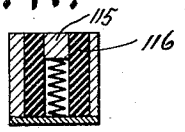


Fig. 17.



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6 SHEETS—SHEET 6.

Fig. 13.

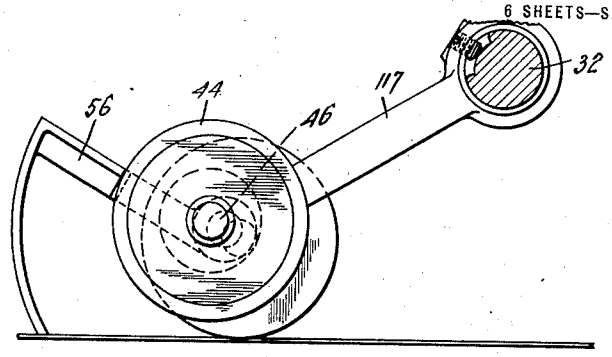


Fig. 14.

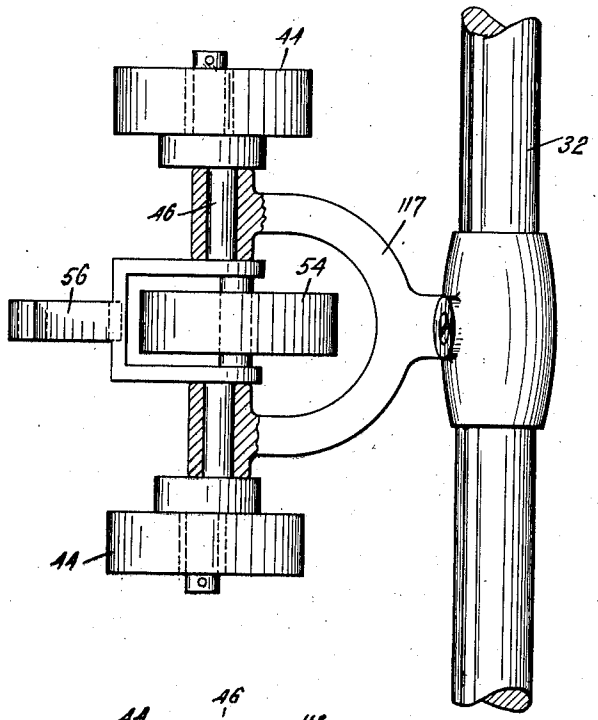
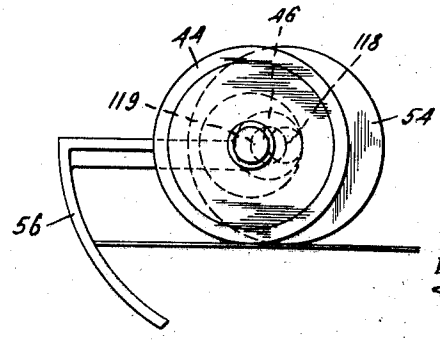


Fig. 15.



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UNITED STATES PATENT OFFICE.

JOSEPH KLEIDMAN, OF NEW YORK, N. Y.

PAPER-FEEDING MACHINE.

1,374,303. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed January 24, 1918. Serial No. 213,546.

To all whom it may concern:

Be it known that I, JOSEPH KLEIDMAN, a citizen of Russia, and a resident of the city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

The present invention relates to paper feeding machines for printing presses, ruling machines and the like, for feeding in regular order of succession sheets from a pile or stack of paper, suitably arranged on a table that is located in proximity of the apparatus. The invention pertains more particularly to the type of paper feeding machines described in U. S. Letters Patent No. 911,132, granted to me on the 2nd day of Feb., 1909. In this patent a machine is described, including a feeding roller having a bodily motion to and from the front edge of the sheets, provided with a friction covering and adapted to engage the sheet to be fed, in combination with means for automatically arresting the rotation of said roller at a predetermined point from the front edge of said sheet. In practice it has been found that the feeding operation of a roller of the type mentioned is to some extent uncertain, due to the fact that the friction covering of the roller has a tendency to move the sheet forward even before its rotation is arrested.

The main object of the present invention is to provide a device that overcomes this defect, by causing the feeding means proper to engage the top sheet of the pile at a predetermined point from the front edge of said sheet, thereby preventing a movement of the sheet ahead of the proper time.

Another object of the invention is to generally improve and simplify the feeding machines.

A further object of the invention is to provide a simple, inexpensive and automatic table raising mechanism for paper feeding machines.

A still further object of the invention is to provide means which permits a new pile or stack of paper to be placed on the machine while the feeding operation proceeds from the stack already on the machine.

Another object of the invention is to provide simple means for holding the other sheets of paper from movement while the top sheet is being advanced and removed.

With these and other objects in view, which will more fully appear as the nature of the invention is better understood, the same consists in the combination, arrangement and construction of parts hereinafter described, pointed out in the appended claims and illustrated in the accompanying drawings, it being understood that many changes may be made in the size and proportion of the several parts and details of construction within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

Two of the many possible embodiments of the invention are illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of a paper feeding machine constructed in accordance with the present invention; Fig. 2 is a side elevation thereof, partly in section; Fig. 3 is a detail of construction, showing the location of the advancing means at or about the beginning of its forward movement; Fig. 4 is a top plan view of the detail shown in Fig. 3; Fig. 5 is a section taken on line 5—5 of Fig. 4; Fig. 6 is a side elevation of a mechanism for actuating the paper advancing means; Fig. 7 is a front elevation of the friction covering of the advancing means; Fig. 8 is a side elevation thereof; Fig. 9 is a side elevation, partly in section of part of the table raising device; Fig. 10 is a top plan view, partly in section, of a detail shown in Fig. 9; Fig. 11 is a side elevation of a detail of construction of a mechanism coöperating with the device shown in Figs. 9 and 10, it being a modification of the device shown in Fig. 1; Fig. 12 is a side elevation of the mechanism shown in Fig. 11, showing the elements in other positions; Fig. 13 is a side elevation of a modification of the advancing means; Fig. 14 is a top plan view thereof; Fig. 15 is an elevation similar to the one shown in Fig. 13, showing the elements in other positions; Fig. 16 is a top plan view of a modification of a combing means coöperating with the advancing means; and Fig. 17 is a section taken on line 17—17 of Fig. 16.

Referring first to Figs. 1 to 12, inclusive, the numeral 20 indicates the base of the

machine frame, from which rise standards 21, supporting at their upper ends substantially horizontally extending frame members 22, one on each side of the machine, said frame members being connected in any suitable manner, for instance by tie-rods 23 and 24. Of these rods the one denoted by the numeral 23 is disposed on the front portion and the one denoted by the numeral 24 on the rear portion of the side frames 22. In each side frame and in the base of the machine is rotatably mounted a vertically extending screw-threaded spindle 25, with the threads of which mesh those of nuts 26, that are fixedly attached to table supports 26′ on which rests a table 27, supporting the stack of paper. This table is automatically raised by means hereinafter to be described. The stack of paper is guided in its upward movement by a transverse frame 28, having at its upper free end a forwardly bent lip 29, onto which the paper is brought by the feeding mechanism. The table is guided by rollers 30 on the table supports 26′, which bear against the standards 21 above referred to.

The main shaft 31 of the machine is journaled in the side frames 22, and is rotated from any suitable source of power, for instance an electric motor, not shown in the drawings. This shaft operates through the medium of a suitable intermediate mechanism the feeding means of the apparatus. This feeding means is mounted in a manner hereinafter to be described upon a rock-shaft 32, which is slidably arranged in horizontally extending slots 33 in the side frame members 22. To the shaft 32 are fixedly attached levers 34 to which are pivoted at 35 links 36, the other ends 36′ of which are connected in a similar manner with arms 37 and are guided by horizontal ledges 36″. Each of these arms is provided near its free end with a longitudinal slot 38, through which extends the main shaft 31. Each arm 37 carries a lug 39, having an anti-friction roller 40, bearing against an eccentric 41 on the main shaft. With each lever 34 cooperates a spring 42, one end of which bears against the respective lever, while its other end abuts against a stationary stop 43 on the side frames of the machine. On the rock-shaft 32 is mounted the sheet feeding or advancing means. This means includes a plurality of, preferably, cylindrical blocks 44, of which there may be employed any suitable number according to the requirements. From Fig. 1 it appears that there are four of these blocks used, arranged, preferably, in pairs. From the detail illustrated in Fig. 4 of the drawings it is noted that these blocks are provided with peripheral flat screw-threads 45, those constituting a pair being threaded in opposite directions, for a purpose hereinafter to be fully described. The blocks are made of a material having a high coefficient of friction, for instance rubber, or they may be made of any suitable material and provided with a suitable friction covering.

Each pair of blocks 44 is fixedly attached to the ends of a spindle 46, that is oscillatably mounted in a frame 47, the latter being carried by a plurality of blade springs 48, which are secured to a sleeve 49, that is drawn over the rock-shaft 32. This sleeve is held in position upon the rock-shaft by stop rings 50, but is permitted to have a slight oscillating motion on the said shaft. For this purpose the shaft is provided with a groove 51, in which is seated a spring pressed pin 52 upon the sleeve. The diameter of this pin is smaller than the width of the groove, thereby permitting the said sleeve and the parts carried thereby to have a slight motion in relation to the rock-shaft. Preferably, centrally there is provided upon the spindle 46 a crank arm 53, on which is mounted a roller 54, a ball bearing 55 being provided to prevent undue friction between the said roller and the crank arm. This roller has a very smooth peripheral portion and is, preferably, made of metal. To the spindle is furthermore rigidly attached a forwardly extending finger 56, preferably in alinement with the roller 54. In the path of the finger 56 there is formed in the lip 29 a slot 57, into which the said finger is lowered by gravity when moved beyond the front edge of the top sheet of the stack of paper. On the lip 29 are furthermore arranged, in the path of the blocks 44, friction strips 58, which are preferably triangular in configuration, their width decreasing gradually from their rear edge 59 toward their front edge 60. These friction strips are, preferably, made of rubber, their friction surface, however, being somewhat smoother than that of the blocks 44. Spring-pressed metal balls 61 project a little distance above the upper surface of the strips 58, to aid in the separation or combing of the paper sheets. The frictional action of the strips 58 decreases toward their forward ends. This is due to the fact that the blocks 44 move off the inner inclined edges of these strips in their forward travel.

The top sheet of the stack of paper is advanced by the blocks 44 within the reach of a conveying means, consisting of a roller 63, that is rotated by means of a chain 64 and sprocket wheels 65 and 66, the sprocket wheel 65 being attached to one of the journals of the said roller and the sprocket wheel 66 to the main shaft 31. A clutch 67 is provided for connecting or disconnecting, at will, the sprocket wheel 66 from the main

shaft. The roller 63 and the main shaft 31 may be actuated manually, and are for this purpose provided with hand wheels 68 and 69, respectively. Upon the roller 63 are wound feeding belts 70, forwarding the sheet toward the cylinder of the printing press. Pressure rollers 71 rest normally on the roller 63. Each of these pressure rollers is mounted upon one arm of a bell crank lever 72, said levers being fulcrumed to the tie-rod 23 and carrying on their free ends rollers 73, coöperating with cams 74 on the main shaft of the machine. Springs 75 have a tendency to keep the pressure rollers in contact with the roller 63. The purpose of the cams 74 is to raise and lower the pressure rollers at times when the front edge of a top sheet of the stack of paper reaches the roller 63. The feeding bands deliver the sheets to the cylinder of the printing press, it being obvious that means must be provided whereby the sheet is brought into proper relation to the cylinder. This means is not shown in the drawings, as it does not form part of the present invention.

The operation of the elements so far described is as follows: The sheets of the stack of paper are moved by the blocks 44 forward onto the slightly inclined lip 29. Inasmuch as the resistance of the friction strips 58 decreases from their rear edges 59 toward their front edges 60, a number of sheets on top of the pile is staggered or combed, those disposed higher being caused to move further forward than those located lower on the stack. Furthermore, inasmuch as the spring-pressed metal balls 61 project a slight distance above the upper surface of the said friction strips, a "beating" action will be obtained, with the result that the staggering or combing action will be greatly facilitated. As the machine is started and the main shaft 31 rotated, the rock-shaft 32 is caused to move in the slots 33 back and forth. In Fig. 2 of the drawings the rock-shaft is shown in its rear position, in which the rollers 54 rest on the top sheet of the pile, the feeding blocks 44 being in their raised positions, in which they do not contact with the top sheet. The blocks are kept in their raised positions by reason of the fact that the fingers 56 rest on the top sheet. When, therefore, the rock-shaft moves forward, the blocks do not move the paper. When, however, in the further forward movement of the rock-shaft, the fingers 56 drop into the slots 57 in the lip 29, the spindles 46, to which the said fingers are attached, are lowered until the blocks 44 contact with the top sheet. In this manner, in the further forward movement of the rock-shaft, the top sheet is carried forward, the sheets lying underneath the top sheet, however, are prevented from movement by the friction strips 58, arranged in the path of the blocks, which strips produce a friction greater than that between two subsequent sheets. When the feeding blocks have reached their foremost position, the top sheet is within the reach of the conveying roller 63, at which time the pressure rollers 71 are moved downwardly, whereby the sheet is conveyed to the printing press. As soon as the conveying roller 63 engages the sheet of paper, the rock-shaft is moved backwardly. Inasmuch as the springs 42 bear against the levers 34, the shaft 32 is first rocked, whereby the blocks 44 and the roller 54 are lifted, that is to say disengaged from the paper sheets, due to the fact that the friction between the shaft 32 and slots 33 is sufficient to prevent the levers 34 from moving, under the action of the springs 42, counter-clockwise. The rollers 54 are kept in raised positions until the rock-shaft reaches its rear position, when the rollers 54 are again moved into contact with the stack of paper. Inasmuch as the crank arm 53 and roller 54 are heavier than the respective finger 56, the finger will be held in elevated position when the rollers 54 are not in contact with the stack of paper.

From the foregoing it appears that the feeding blocks come into contact with the paper and are caused to become operative at a predetermined point from the front edge of the paper. The connection between the roller- and block-carrying brackets and the rock-shaft 32 is somewhat yielding, as above mentioned, in order to compensate for the difference in the level of the top sheet of the pile that may exist due to sudden operation of the table raising mechanism, or otherwise.

Automatically acting means are provided for raising the table, carrying the stack of sheets, as the feeding proceeds therefrom. This means comprises a shaft 84, rotatably mounted in the side frames 22 and provided with a hand wheel 85, to permit of actuating the same manually. On this shaft are rigidly mounted two worms 86, meshing with worm gears 87, which are secured to the upper ends of the screw-threaded spindles 25. The shaft 84 is rotated intermittently, as the height of the stack of paper decreases. For this purpose, there is drawn over the said shaft a tubular member 88, to which is attached a ratchet wheel 89, the teeth of which are engaged by a pawl 90, carried by a bell-crank lever 91, that is oscillatably mounted upon the tubular member 88. The connection between the tubular member 88 and the shaft 84 may be made by any suitable means, for instance a pin 92, extending through the said tubular member

into a recess 93 in the said shaft. The bell-crank lever 91 carries at its free end a roller 94, coacting with a cam 95, mounted on the main shaft 31. The bell-crank lever 91 is adapted to rest on a projection 96, carried by a spring 97, the latter being fastened to a lever 98, which is fulcrumed to the tie-rod 23. The lever 98 carries a roller 99, coacting with a cam 100 on the main shaft 31. The lever 98 extends through an aperture 101 in a substantially vertically extending foot 102, that is vertically movable and guided in its movement by rollers 103 on a bracket 104. This bracket is attached to the tie-rod 23. The foot 102 is adapted to bear against the top sheet of the stack of paper.

The pawl 90, above referred to, is by its own weight continuously in engagement with the teeth of the ratchet wheel, and the cams 95 and 100 are constructed in such a manner that the bell-crank lever 91 can complete its stroke in the direction of the arrow shown in Fig. 11 only in case the foot 102 is adapted to sink below the normal level of the top sheet of the paper stack.

The operation of the table raising means is as follows:— The foot 102 normally rests upon the top of the stack of sheets. Therefore, as the cam 100 rotates, the said foot does not permit the lever 98 to swing around its fulcrum downward as fully as the cam 100 would allow. The bell-crank lever 91 is thereby prevented by the projection 96 from swinging around its fulcrum in the direction of the arrow shown in Fig. 11 as far as the cam 95 would permit, and for this reason the pawl 90 cannot engage the next tooth in the series of the ratchet wheel 89. As the height of the stack is decreased, the lever 98 is permitted to complete its downward stroke (Fig. 12), with the result that the projection 96 on the said lever allows the bell-crank lever to swing fully around its fulcrum, whereby the pawl 90 moves into engagement with the next adjacent tooth of the ratchet wheel. As now the main shaft 31 completes its next turn, the bell-crank lever 91 moves the tubular member 88 and thus the shaft 84 through an angular distance corresponding to that of one tooth of the ratchet wheel. Consequently, the spindles 25 are given a partial turn, resulting in a corresponding raising of the stack carrying table.

Means are provided which permit a new stack of paper to be placed on the machine without discontinuing the feeding operation. For this purpose, there are attached to the tubular member 88 two drums 105, to each of which is secured a cable 106. These cables run over sheaves 107 and carry at their ends loop-shaped supports 108, into which fit arms 108′, secured to the underface of the table 27. Upon each pulley are formed ratchet teeth 109, in engagement with pawls 110, permitting the tubular member 88 to rotate only in the direction in which it is actuated by the pawl 90 upon the bell-crank lever 91.

The operation of this device is as follows: Normally the arms 108′ on the table 27 are disengaged from the loop-shaped supports 108, the table being raised in the manner above described. Obviously, as the drums 105 rotate with the tubular member 88, the cables 106 are wound up thereon. When the supply of paper on the table runs low, the arms 108′ thereon are seated in the loop-shaped supports 108 and the pin 92 withdrawn from the tubular member 88 and shaft 84, thereby disconnecting these last mentioned two elements. In this manner the screw-threaded spindles 25 become stationary, yet the table is raised as the drums 105 are being intermittently rotated by the bell-crank lever 91. The operator is thus in a position, while the feeding proceeds, to turn the shaft 84 so as to lower the table supports 26′ and to place thereon, when in their lowermost positions, a new table with a stack of paper. As soon as the supply from the first table is exhausted, this table is removed from the machine, and the second table raised into proper position, after which the feeding proceeds in the regular manner, it being obvious that first the drums must be turned so as to unwind therefrom the cables, and then the connection must be reëstablished between the tubular member 88 and the shaft 84. For turning the drums independently of the shaft 84, there is attached to one of the same a pinion 111, in mesh with a gear 112, that is mounted upon a shaft 113, the latter being suitably journaled in the side frames of the machine. To the shaft 113 is secured a hand wheel 114, or similar means.

A modification of the paper feeding or advancing means is shown in Figs. 13 to 15, inclusive, differing from the one above described in that the bracket, by means of which the connection is made between the blocks 44 and the rock-shaft 32, is made of a rigid piece 117, instead of a resilient composite member. Moreover, the center 118 of the roller 54 is disposed in rear of the axis of the spindle 46, while the centers 119 of the blocks 44 are located in front of the said axis. Due to this arrangement, the mechanism is more balanced and the finger 56 may be made considerably lighter.

Instead of making the friction strips 58 triangular, as shown in Fig. 4 of the drawings, there may be provided alternate metallic strips 115 and rubber strips 116, which are disposed at an angle to the direction of movement of the blocks 44, as shown in

Figs. 16 and 17. By means of this construction the same results may be obtained as with the one above referred to.

What I claim is:—

1. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

2. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and gravity operated means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

3. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame provided with a friction covering, and means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

4. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a shaft oscillatably mounted on said frame, a roller on said shaft adapted to engage the sheet to be fed on the feeding stroke of said frame, a block attached to said shaft, and means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

5. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

6. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and gravity operated means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

7. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a shaft oscillatably mounted on said frame, a roller on said shaft adapted to engage the sheet to be fed on the feeding stroke of said frame, a block attached to said shaft, and means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

8. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a shaft oscillatably mounted on said frame, a roller on said shaft adapted to engage the sheet to be fed on the feeding stroke of said frame, a block attached to said shaft, and gravity operated means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

9. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

10. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and gravity operated means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

11. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame provided with a friction covering, and means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

12. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to

and from the front edge of the sheets, of a shaft oscillatably mounted on said frame, a roller on said shaft adapted to engage the sheet to be fed on the feeding stroke of said frame, a block attached to said shaft, and means for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

13. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

14. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a roller on said frame adapted to engage the sheet to be fed on the feeding stroke of said frame, a block oscillatably mounted on said frame, and gravity operated means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

15. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a shaft oscillatably mounted on said frame, a roller on said shaft adapted to engage the sheet to be fed on the feeding stroke of said frame, a block attached to said shaft, and means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

16. In a machine for feeding sheets of paper from a pile, the combination with a resilient frame having a bodily motion to and from the front edge of the sheets, of a shaft oscillatably mounted on said frame, a roller on said shaft adapted to engage the sheet to be fed on the feeding stroke of said frame, a block attached to said shaft, and gravity operated means controlled by said sheet for causing said block to engage said sheet at a predetermined point from the front edge of the latter.

17. In a machine for feeding sheets of paper from a pile, the combination with a frame having a bodily motion to and from the front edge of the sheets, of a block thereon adapted to engage the sheet to be fed, and means on said block for causing momentarily a portion of the sheet to move in a direction at an angle to the direction of travel of said block.

Signed at New York, in the county of New York, and State of New York, this 23 day of Jan., A. D. 1918.

JOSEPH KLEIDMAN.