No. 801,991. PATENTED OCT. 17, 1905.

H. K. KING.

SHEET FEEDING DEVICE.

APPLICATION FILED MAY 28, 1904.

6 SHEETS—SHEET 1.

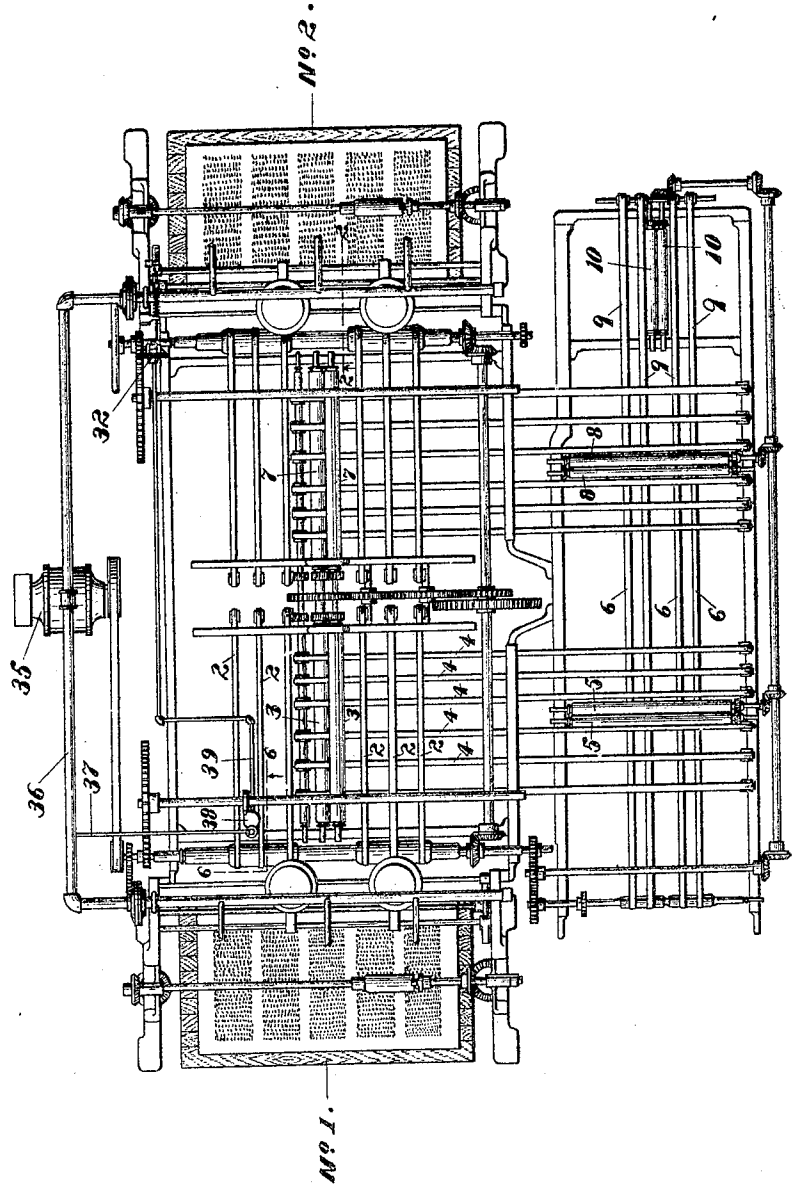


Fig. 1.

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Chas. T. Schaffer.

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Geo. Howard

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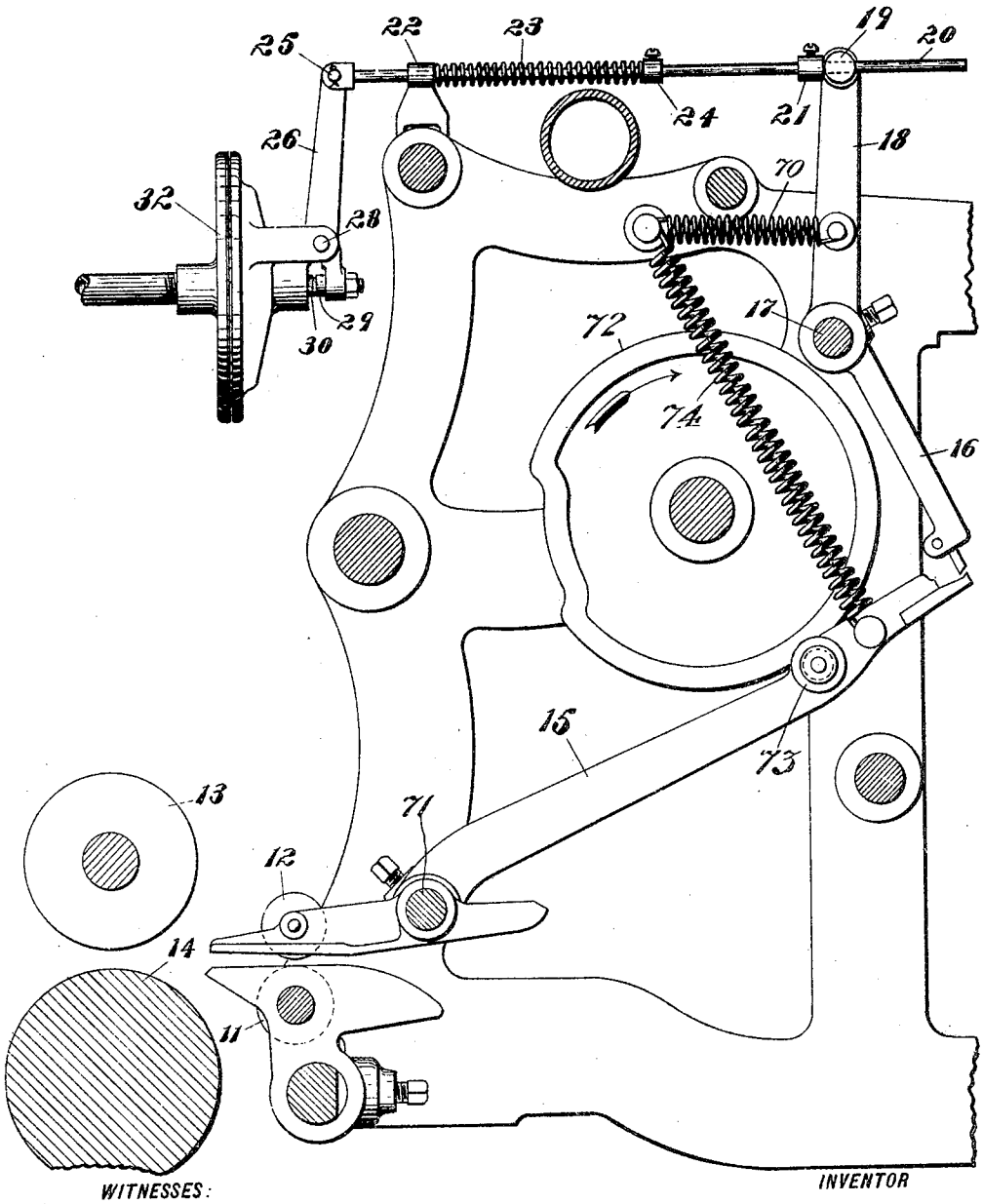
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6 SHEETS—SHEET 2.



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Fig. 2.

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6 SHEETS—SHEET 3.

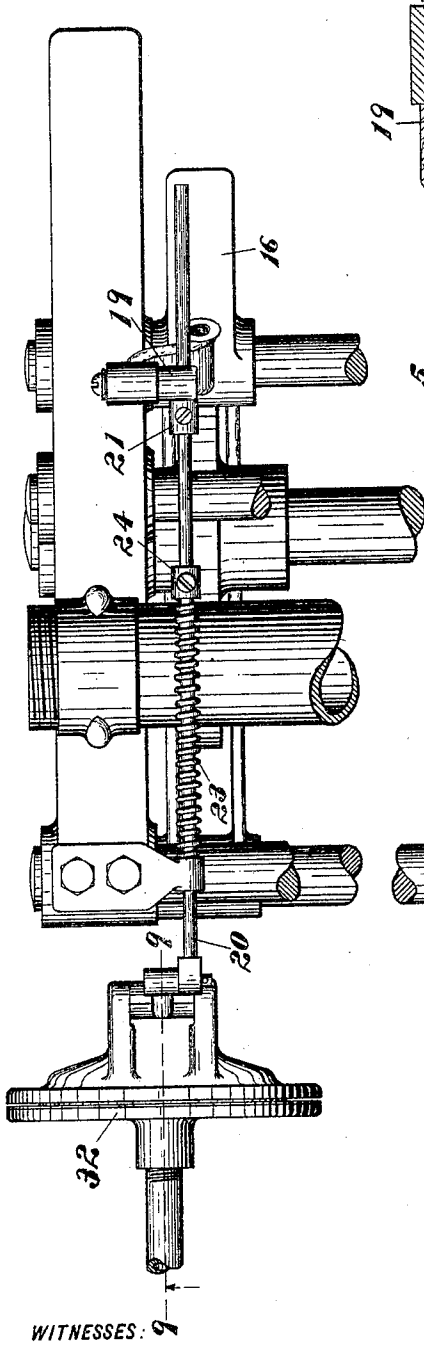


Fig. 5.

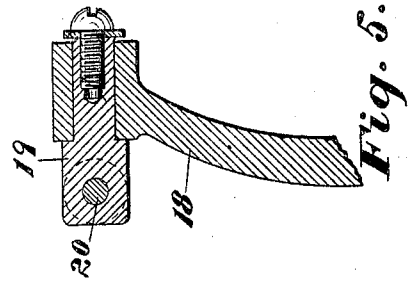


Fig. 4.

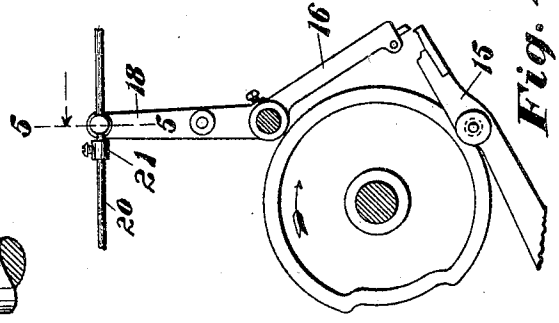
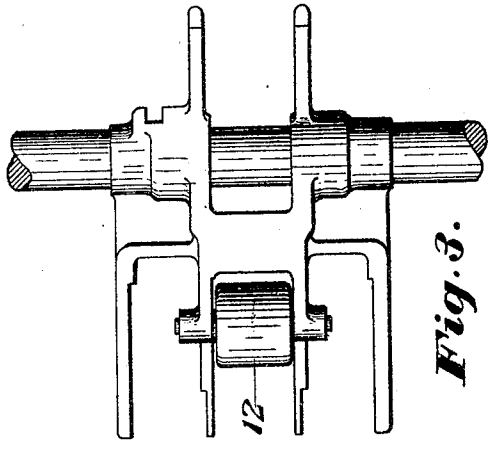


Fig. 3.



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6 SHEETS—SHEET 4.

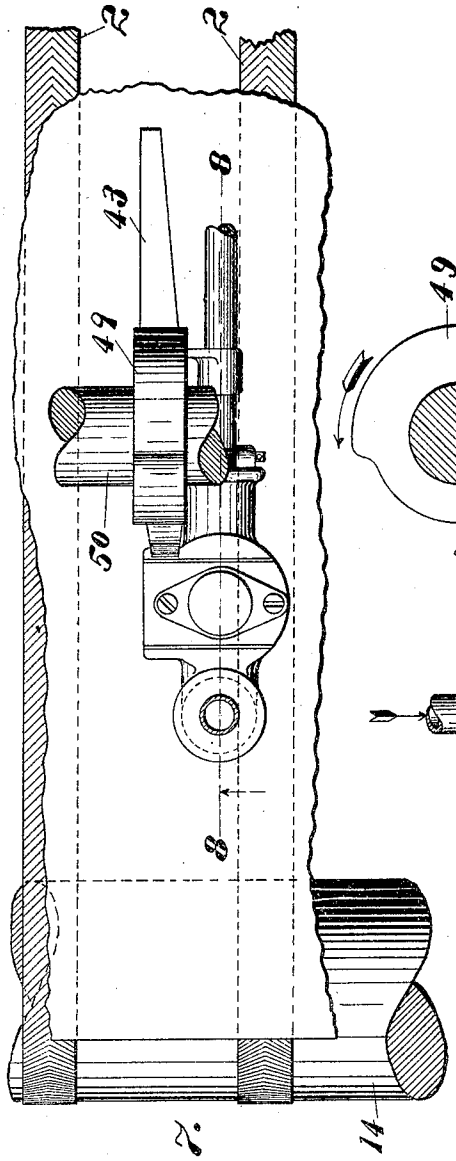


Fig. 7.

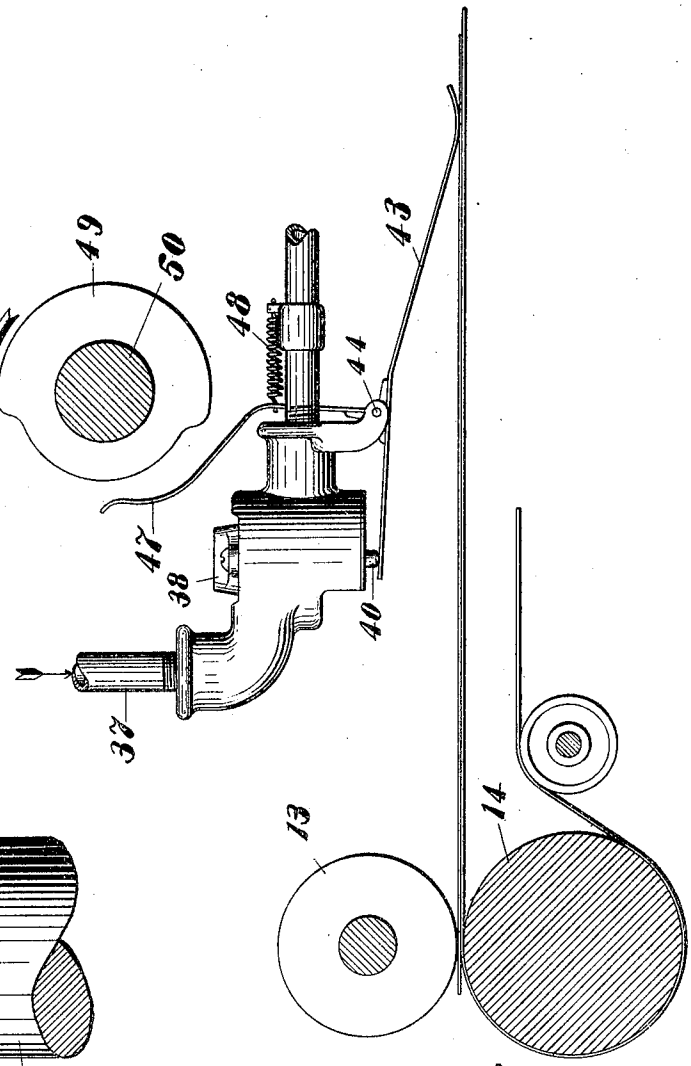


Fig. 6.

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6 SHEETS—SHEET 5.

Fig. 8.

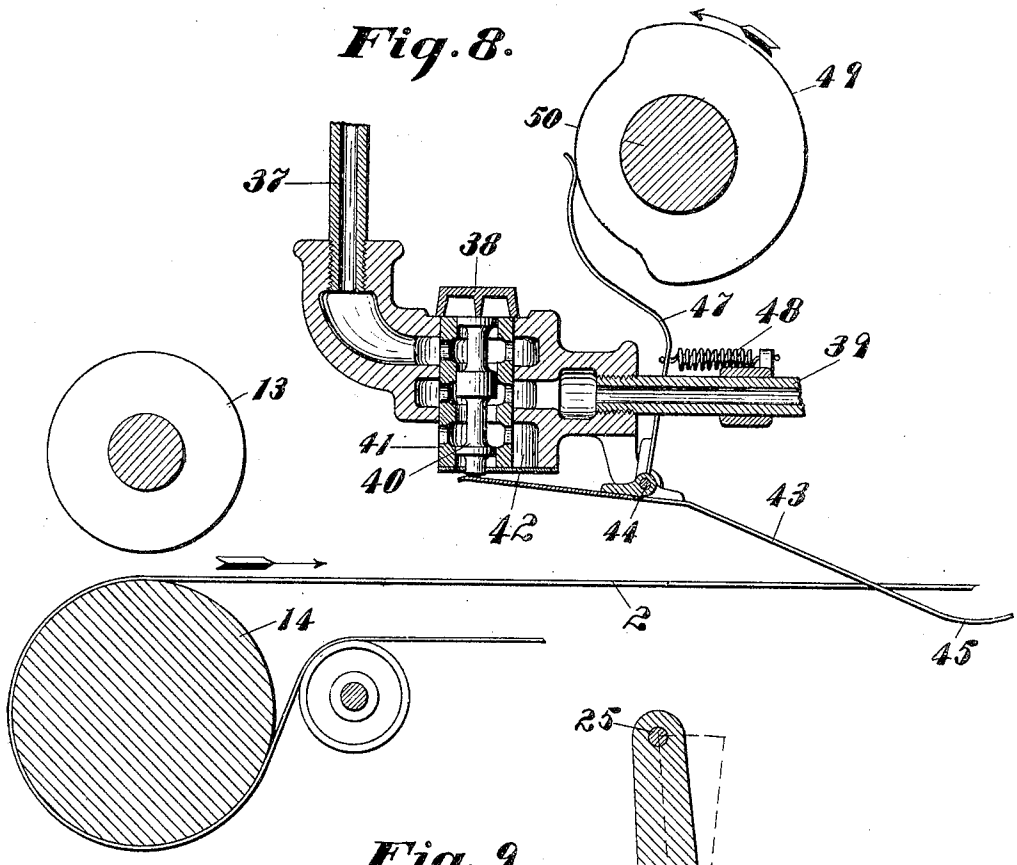
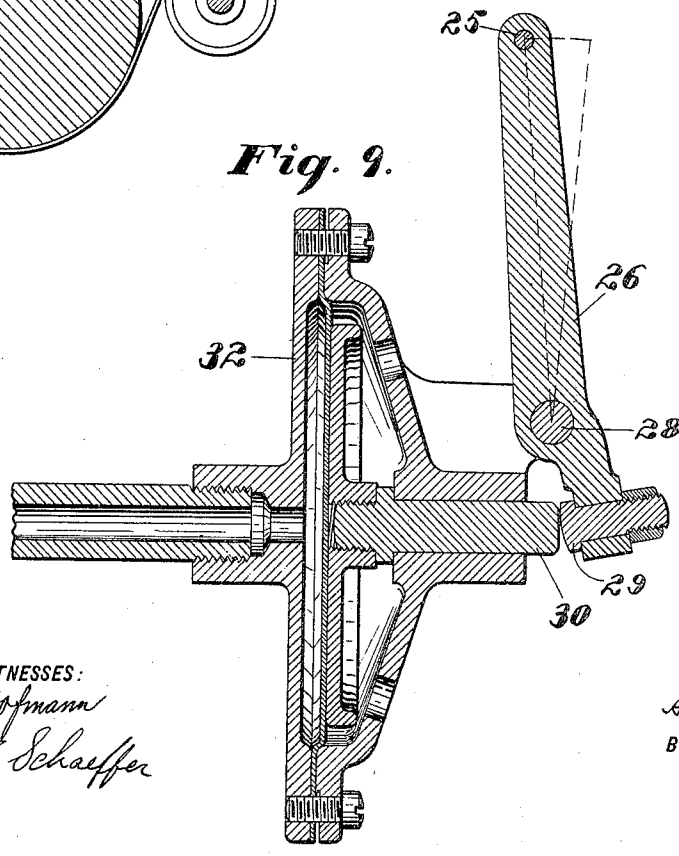


Fig. 9.



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No. 801,991. PATENTED OCT. 17, 1905.

H. K. KING.

SHEET FEEDING DEVICE.

APPLICATION FILED MAY 28, 1904.

6 SHEETS—SHEET 6.

Fig. 11.

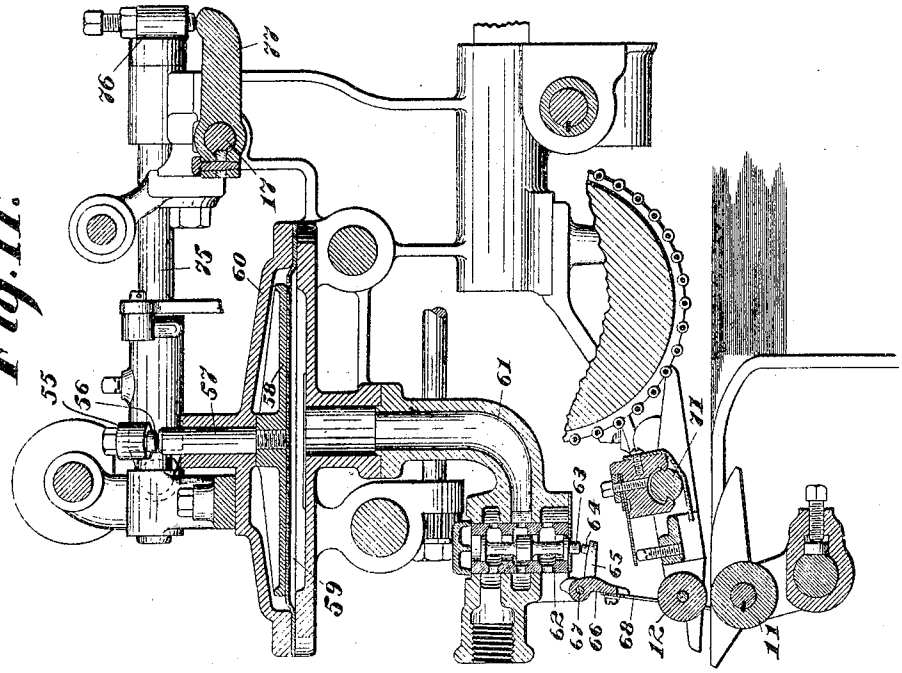


Fig. 10.

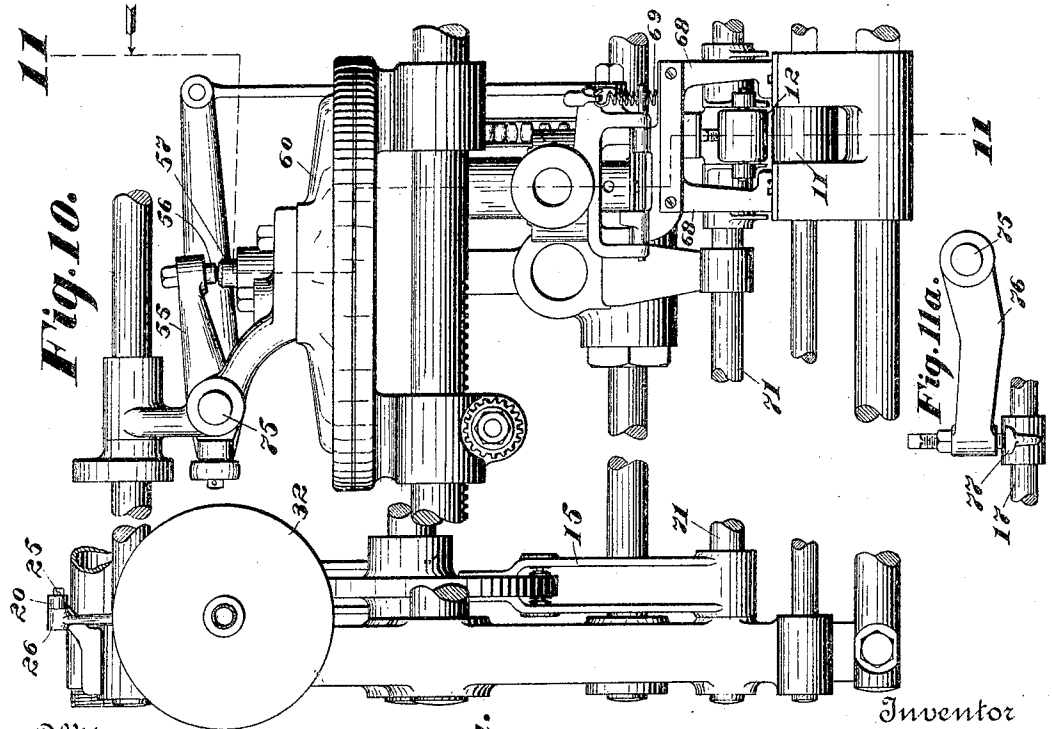
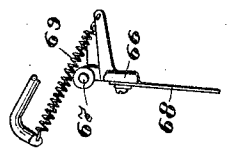


Fig. 11a.

Fig. 10a.



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By Thos. Worsdale
his Attorney

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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING DEVICE.

No. 801,991. Specification of Letters Patent. Patented Oct. 17, 1905.

Application filed May 28, 1904. Serial No. 210,198.

To all whom it may concern:

Be it known that I, HOWARD K. KING, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Sheet-Feeding Machine, of which the following is a specification.

My invention relates to sheet-feeding machines.

The object of my invention is to provide improved means for controlling the operation of a sheet-feeding machine or other machine adapted to operate upon sheets, said controlling means being actuated or controlled by a sheet operated upon by a different machine. A simple application of my device, for example, would be the connecting of two or more sheet-feeding machines adapted to feed to a common folding-machine, the operation of one sheet-feeding machine being controlled by the predetermined movement or position of a sheet operated upon by the other sheet-feeding machine. For instance, where sheet-feeding machine No. 1 should be adapted to deliver to a folding-machine from one side and sheet-feeding machine No. 2 should be adapted to deliver to the same folding-machine from the other side, said sheets from each of said feeding-machines intended finally to be brought together by the folding-machine, it becomes important that the operation of one feeder shall be controlled by the operation of the other feeder. The reason for this is that the sheets from the respective feeders shall be delivered to the folder at the desired relative moments in order that they shall assume their proper positions relatively to each other in the final folding operations of the folder. Assuming that a sheet is delivered from feeder No. 1 to the folder and is carried by the tapes 2 of the folder over the rollers 3 when it is sent in the usual way through said rollers 3, making the first fold of the sheet, the folded sheet is then carried on tapes 4 over the rollers 5, through which it is sent with a second fold to the tapes 6. Meanwhile a sheet from the feeder No. 2 is similarly carried through rollers 7 and rollers 8. Now where it is designed that the folded sheet from feeder No. 1 should be folded with the folded sheet from feeder No. 2 the relative machines are so timed as to provide that sheet from feeder No. 2 shall lie beneath the rollers 8 when the sheet from feeder No. 2 is carried through said rollers, so that both sheets will lie one upon the other to be carried by the tapes 9 over rollers 10 and by said rollers 10 be folded together. Of course it will be obvious that if the feeders should not be perfectly timed so as to operate exactly at the proper respective moments these sheets would not be properly superimposed when arriving at rollers 10. I have therefore provided means whereby the sheet delivered from feeder No. 1 shall control certain tripping mechanism, which in turn shall control the intermittent delivering mechanism of the feeder No. 2.

Referring to the drawings, Figure 1 is a plan view. Fig. 2 is a sectional elevation on line 2 2 of Fig. 1 with the head omitted. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is an elevation, on a reduced scale, of the cam-and-latch mechanism shown in Fig. 2, but in the reversed position. Fig. 5 is a section on line 5 5 of Fig. 4 on an enlarged scale. Fig. 6 is a cross-section on line 6 6 of Fig. 1. Fig. 7 is a plan view of same. Fig. 8 is a sectional view on line 8 8 of Fig. 7. Fig. 9 is a vertical section on line 9 9 of Fig. 3. Fig. 10 is an elevation of the pneumatically-operated means for actuating shaft 17 and the valve-trip for controlling same. Fig. 10^a is a detail of the valve-trip. Fig. 11 is a vertical section on line 11 11 of Fig. 10. Fig. 11^a is a detail of arms 76 and 77 and their respective shafts 75 and 17.

Similar numerals refer to similar parts throughout the several views.

Referring to Fig. 2, the drop and feed roller mechanism shown in this figure is similar to the mechanism described in detail in Letters Patent to me No. 768,375, dated August 23, 1904, for machine for feeding sheets—that is, the feed-roller 11 is continually rotated, while the drop-roller 12 is an idler which is intermittently oscillated into and out of engagement with said feed-roller to deliver the sheet to the drop and feed rollers 13 and 14 of the receiving device. The drop-roller 12 is supported on the oscillating member 15, which is mounted on shaft 71 and operated by the cam 72. This member 15 is provided with the roller 73, adapted normally to engage with the periphery of cam 72, due to the actuating of spring 74. The oscillating movement of member 15 is, however, controlled by the latch member 16, mounted on

the shaft 17 and normally controlled in one direction by the spring 70. The member 16 and its extension 18 are keyed to shaft 17, and the rotative movement of shaft 17 in response to the pull of spring 70 is controlled by pneumatically-operated means. The pneumatically-operated means for controlling the shaft 17, and consequently for controlling the latch 16, is controlled by the advancing sheet by the following-described mechanism: Keyed to shaft 75 is the arm 55. (See Figs. 10 and 11.) The free end of arm 55 is provided with an adjustable toe-piece 56, adapted to rest upon the upper extension of piston-rod 57. The piston-rod 57 is secured to the piston 58, which rests upon the flexible diaphragm 59 in the head 60. This head 60 is connected with a source of air-supply under pressure by the conducting-pipe 61. The admission of compressed air to the head and the escape of said air therefrom are controlled by the valve 62. This valve 62 comprises a cylinder and a vertically-movable piston 63, the cylinder having a series of ports controlled by the piston. The arrangement of the valve is such that when the piston is down—that is, in its lowest position, as shown in Fig. 11—communication is established between the source of air-pressure and the head 60. When, however, the piston is elevated, communication between the air-pressure and head 60 is interrupted and communication is established between the head 60 and the outside atmosphere, whereby any pressure in the head is permitted to be relieved. As will be seen by an inspection of Fig. 11, the lower end of piston 63 rests against toe-piece 64 at the free end of arm 65, which is integral with member 66, which is pivoted at 67 and provided with the downwardly-extending arms 68. This tripping member is normally held by spring 69 in the position shown in Fig. 10[a], which serves to maintain the piston 63 in the elevated position. When, however, the lower extensions of arms 68 are encountered by the advancing sheet, the trip member is moved in the position shown in Fig. 11, which permits the fall of piston 63 by gravity to the position shown in Fig. 11. It will thus be seen that when trip 66 is actuated by the advancing sheet the valve-piston 63 falls, and communication is established between the air-pressure and the head 60, the diaphragm 59 is raised by cause of the pressure introduced into the head, and the piston-rod 57 is consequently raised, and also the arm 55, causing a slight rotation of shaft 75 in the counter-clockwise direction. Upon shaft 75 is also keyed the arm 76, (see Figs. 11 and 11[a],) while on shaft 17 is keyed the arm 77, the free end of which is adapted to have adjustable engagement with the free end of arm 76. It will now be seen that when arm 55 is raised by piston-rod 57, causing the rotation of shaft 75 and the raising of arm 76, this permits the elevation of the free end of arm 77 and the consequent rotation of shaft 17 in response to the pull of spring 70, which results in the disengagement of latch 16 from the cam-operated member 15. It is thus provided that the oscillating delivery mechanism, comprising the drop-roller 12, cannot assume the operative position until the sheet has come in exactly the right position to actuate the valve-trip 66 and permit the unlatching of member 15.

Additional controlling mechanism for the delivering mechanism.—To this mechanism I now apply the following mechanism for the further latching control of arm 15 by latch 16. To latch member 16, I provide the extension 18, upon the upper free end of which is swiveled the stud 19, through which projects the rod 20, upon which is adjustably secured the collar 21, adapted to engage with the stud 19. Near its other extension this rod passes through the sleeve 22, which is secured to the stationary framework of the machine, said rod being freely slidable in sleeve 22 and stud 19. The compression-spring 23 surrounds rod 20 and operates between sleeve 22 and collar 24, which is also adjustably secured to rod 20. To the left-hand free end of rod 20, at 25, is pivotally secured the free end of the oscillating lever 26, the fulcrum of said lever being the pivot 28, secured to the stationary part of the machine. The lower end of said lever 26 is provided with the adjustable toe 29, which is adapted to engage with piston 30, which is operated by a diaphragm in the head 32, to which is admitted compressed air, said admission being controlled in the manner hereinafter to be described. It is sufficient to explain in connection with the mechanism illustrated in Fig. 2 that when the diaphragm in head 32 is under air-pressure the piston 30 is pushed forward to operate the lower end 29 of lever 26, which moves the rod 20 toward the left against the tension of spring 23. Collar 21 is thereby withdrawn from the stud 19, which is pivoted on the end of lever 18, thereby withdrawing the obstruction to the operation of latch member 16. When, however, air is exhausted from the diaphragm-head 32, the rod 20 is moved into and held in the position shown in Fig. 2, with the collar 21 in engagement with stud 19, thereby holding latch member 16 in the latching position and preventing it from responding to the ordinary conditions or normal conditions in the manner fully explained and described in my patent above referred to. In other words, the mechanism, including the pneumatically-operated piston 30 and the mechanism having operative connection between said piston and the latching member 16, serves as an additional control for latching member 16 to the means already set forth in my said patent above referred to. The details of this mechanism are illustrated in Figs. 3, 4, 5, and 9. Fig. 3 is a plan view of the connecting mechanism between the pneumatically-operated piston 30

and the latching member 16. The stud 19 is shown in section in Fig. 5, being rotatably secured in the end of lever 18, with the rod 20 slidably mounted therein. Fig. 4 shows the rod 20 in the position with collar 21 withdrawn sufficiently to permit the unlatching of member 18. Fig. 9 is a sectional view of the diaphragm-chamber, showing the piston 30 projected or in the position when the diaphragm is under pressure.

Valve-trip control for said controlling means.—The following mechanism is provided, which is adapted to be operated by the sheet from feeding-machine No. 2 for the control of the last above-described pneumatic controlling mechanism connected with machine No. 1. Referring to Fig. 1, 35 is a blower or other suitable source of air-pressure. 36 is a conducting-pipe to the usual heads and other pneumatically-operated parts of the various feeding-machines. From 36 extends the conducting-pipe 37 to the valve 38, to which is connected the conducting-pipe 39, leading to the head 32. The valve 38 therefore controls the air-pressure from the main pipe 36 to head 32. This valve 38 is preferably so located that its controlling mechanism will be within the range of control of the advancing sheets from feeding-machine No. 2. For example, I have found it convenient to locate this valve 38, with its controlling-trip, immediately in advance of the drop and feed rollers of said feeding-machine No. 2. The valve and its controlling mechanism are shown in sectional detail in Fig. 8. The valve 38 is of the same type as that fully illustrated and described in my said patent above referred to, having a vertically-movable piston member 40 adapted to reciprocate in the cylinder 41, which is provided with three sets of openings, whereby the movement of the piston member to its highest position, as shown in Fig. 8, shuts off the air-pressure from the source of supply delivered through pipe 37 and permits the escape of air from pipe 39 through outlet 42. When, however, the piston member is permitted to move to its lowest position, communication is open between pipes 37 and 39 and closed to the outside atmosphere, so that the pressure from 37 is communicated to diaphragm-head 32 with results above described.

The control of piston member 40 is accomplished by the following mechanism: The lever 43 is pivotally secured at 44 to the stationary parts of the machine, having one end 45 adapted to project between the conveying-tapes 2 when in the position shown in Fig. 8, thereby maintaining the piston member 40 in the elevated position. This pivoted member 43 is provided with the upward extension 47, having a spring 48 connected therewith, adapted to maintain the member 43 normally in the position shown in Fig. 8. The upper extremity of extension 47 is adapted to encounter a cam 49, which rotates in the direction of the arrow, as shown in Fig. 8, and tends to reciprocate the lever or tripping member 43 with each rotation of said cam member, and thereby permit the reciprocation of the valve-piston 40 with each rotation of said cam member. The cam member 49 is mounted on the shaft 50, which is suitably coupled with the other operating parts of the machine, so as to secure said reciprocation, for instance, with each reciprocation of the drop-roller. This reciprocation is permitted, however, only when there is no intervening sheet between extension 45 of said member 43 and the tapes 2 to prevent the descent of extension 45 to the position shown in Fig. 8. When, however, a sheet is passing or is held on the tapes under extension 45 of member 43, the said member is held upwardly against the tension of spring 48, as shown in Fig. 6. In this position of trip member 43 the piston 40 is permitted to reside in the downward position, in which position communication will be opened between pipes 37 and 39, causing the actuation of piston 30 and the intermediate mechanism to withdraw the obstruction of collar 21 on rod 20 to the free operation of latch member 16 in case the same is otherwise free to act. It will thus be seen that when there is no sheet passing beneath the trip member 43 the valve-piston 40 will be held in such position as to cut off air-pressure from head 32, and thus permit the tension of spring 23 to lock the latching member 16 in such position as to prevent the operation of drop and feed rollers 12 and 11 of the feeding device No. 2, so that the same will not be permitted to deliver its sheet to the folder. When, however, a sheet is passing along the tapes beneath the trip member 43, it being understood that said trip member has previously been operated by cam 49 to move the same in the position shown in Fig. 6 before the passage of the sheet thereunder, said trip member 43 is held in said elevated position even after the cam member has assumed the position shown in Fig. 6, thereby preventing the trip member 43 from descending to the position shown in Fig. 8 in response to the spring tension 48, and thus the valve-piston 40 is permitted to remain in the lower position with open communication between pipes 37 and 39 to cause the actuation of piston 30 and the consequent actuation of rod 20, so as to withdraw collar 21 from its engagement with stud 19, so as to leave latch member 16 free to act in case the other conditions are present for permitting the drop and feed rollers 12 and 11 to coöperate and permit the delivery of a sheet from feeding device No. 2 to the folder. From this arrangement it results that feeding device No. 2 is not permitted to deliver its sheet to the folder until the sheet from feeding device No. 1 has reached a predetermined position in the

folder which maintains the elevation of extension 45 of tripping member 43.

While my improved trip-operated control has been described in connection with the control of feeding-machines only, it is obvious that said means may be employed for the control of other mechanisms for operating upon the sheet—such, for instance, as mechanism for stitching the sheets, in which it is desirable that the operation of such mechanism shall be permitted only when the sheets have reached certain required relative positions. Such trip-operated control is especially important in connection with the starting and stopping of the various mechanisms to secure the proper sequence in operation of said mechanisms.

What I claim is—

1. The combination of a plurality of sheet-feeding devices, each comprising sheet-delivering mechanism controlled by the advancing sheet and means controlled by the sheet fed from one sheet-feeding device for the further control of the delivering mechanism of another sheet-feeding device.

2. In combination with a receiving-machine and a plurality of sheet-feeding machines, each comprising means controlled by the advancing sheet for delivering said sheet, means whereby the delivering mechanism of one feeding-machine shall be also controlled by a sheet delivered by another feeding-machine.

3. In mechanism for feeding two or more sheets simultaneously, means for feeding one series of sheets, means controlled by the advancing sheet for controlling said feeding means, means for feeding a second series of sheets and means controlled by the sheet of said second series for controlling its feeding means and means whereby one controlling means shall control the other.

4. In combination with means for feeding a plurality of sheets simultaneously or in a required order, means controlled by each sheet for controlling its feed and means for subjecting the control of all the feeding means to each sheet being fed.

5. In combination with a plurality of sheet-feeding machines, a machine for receiving sheets therefrom, and means controlled by the sheet fed by one machine for controlling the operation of another feeding-machine.

6. In combination with a plurality of sheet-feeding machines, each comprising intermittently-operated delivery mechanism, means actuated by the sheet fed by each feeding-machine for controlling the operation of its delivery mechanism and pneumatically-operated mechanism comprising a valve and a valve-trip controlled by the sheet fed from one of said feeding-machines for controlling the delivery mechanism of another feeding-machine.

7. In combination with a plurality of sheet-feeding machines, each having an intermittently-operated delivery mechanism, pneumatically-operated means controlled by the sheets fed by each machine for controlling its delivery mechanism, and additional controlling means for one of said delivery mechanisms, comprising a pneumatically-operated device, a valve for the control thereof and a valve-trip controlled by the sheet fed by another of said machines.

8. In combination with a plurality of sheet-feeding machines, each having intermittently-operated delivery mechanisms, latching means for the control of said delivery mechanisms and means controlled by the sheets fed from one machine for the control of the latching means of another machine.

9. In combination with a plurality of sheet-feeding machines, each having intermittently-operated delivery mechanisms, latching means for the control of each of said delivery mechanisms, pneumatically-operated means for the control of the latching means, a valve and tripping means therefor controlled by the sheets fed from one feeding-machine for controlling the pneumatically-operated controlling means of the latching mechanism of another feeding-machine.

10. In combination with a plurality of sheet-feeding machines, each provided with intermittently-operated delivery mechanism and latching means for the control of the same, pneumatically-operated means for the control of the latching means and valve-trip mechanism operated by the sheet fed by one machine for the control of the pneumatically-operated mechanism of another machine.

11. In a sheet-feeding machine, the combination of pneumatically-operated means for controlling the same, a valve for controlling the pneumatically-operated means, a trip member for controlling said valve, having an extension adapted to move across the line of travel of the sheet and adapted to be encountered thereby, and a cam for normally oscillating said trip member.

12. In a sheet-feeding machine, the combination of pneumatically-operated means for controlling the same, a valve for controlling the pneumatically-operated means, a spring-actuated trip member for controlling said valve, having an extension adapted to move across the line of travel of the sheet and adapted to be encountered thereby, and a cam for normally oscillating said trip member.

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