H. K. KING.

SHEET FEEDING MACHINE.

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1,118,357.

Patented Nov. 24, 1914.

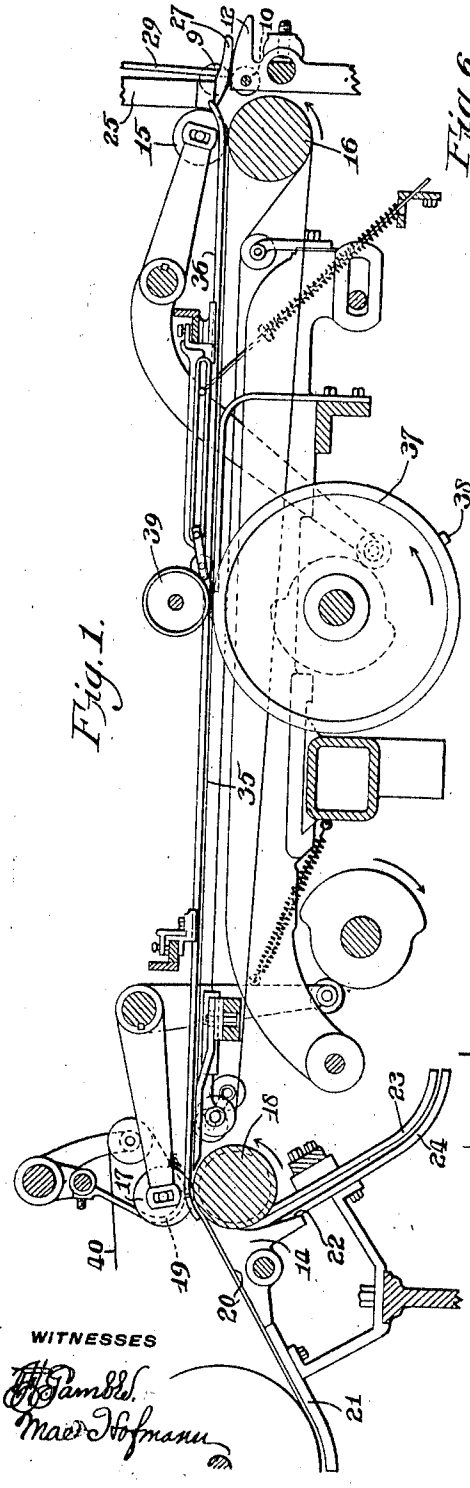


Fig. 1.

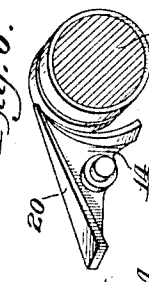


Fig. 6.

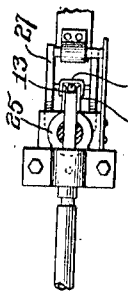


Fig. 5.

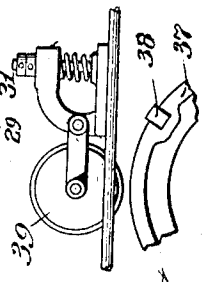


Fig. 7.

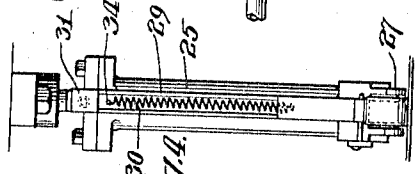


Fig. 4.

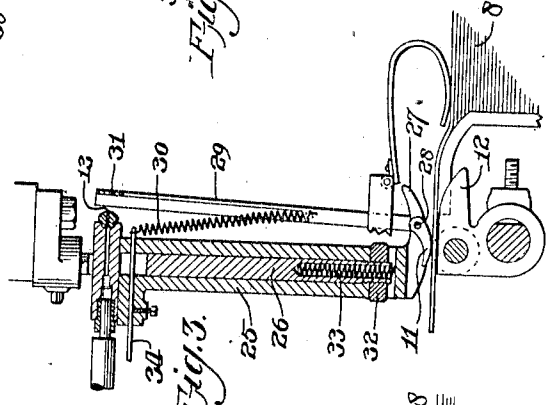


Fig. 3.

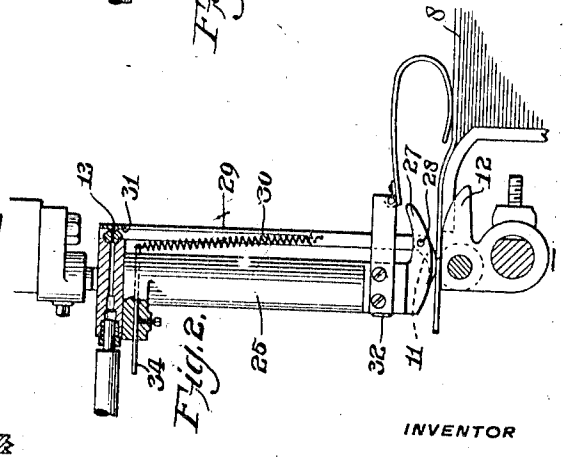


Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MACHINE.

1,118,357. Specification of Letters Patent. Patented Nov. 24, 1914.

Original application filed December 14, 1911, Serial No. 665,725. Divided and this application filed October 17, 1912. Serial No. 726,207.

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, State of Pennsylvania, have invented a new and useful Sheet-Feeding Machine, of which the following is a specification.

My invention relates to improvements in sheet delivering machines, and is especially adapted for use with machines of the character described in my copending application, Serial No. 665,725, filed December 14, 1911, of which this application is a division. That is to say, my invention is especially applicable to sheet delivering machines employing means, controlled by suitable calipering mechanism, for automatically separating the color printed sheets and the interposed blank slip sheets and to deliver the same into separate piles.

This invention comprises a sheet calipering device and associated mechanism, affected by the difference in thickness between the printed sheets and the slip sheets, for controlling suitable switching or other mechanism for effecting the separation and delivery to different points of the different classes of sheets.

It also comprises improved sheet retarding means and other details of construction.

It will be understood that while I have shown the invention as applied to a sheet delivering machine of the slip sheet type, it may obviously be employed for other analogous uses.

Referring to the drawings—Figure 1 is a sectional view showing the application of my invention to a machine of the form shown in my said copending application. Fig. 2 is a side elevation of the calipering device, on an enlarged scale, showing the air passages in section with the escape nozzle closed. Fig. 3 is a vertical section of same, showing the escape nozzle open. Fig. 4 is a rear elevation of the structure shown in Figs. 2 and 3. Fig. 5 is a plan view of same. Fig. 6 is a detail in perspective showing the switch in a different position from that shown in Fig. 1. Fig. 7 is an elevation of the sheet retarding means.

Similar numerals refer to similar parts throughout the several views.

In describing the present invention it will be understood that the sheets from the pile 8 are combed forward to the drop and feed rollers 9 and 10 in the usual manner and by mechanism similar to that shown in my Patent No. 789,809 of May 16, 1905. The relative positions of the drop and feed rollers 9 and 10, with respect to the mechanism of the present invention, is shown in Fig. 1.

It will be understood that the pile of sheets 8 is composed of printed sheets and slip sheets normally alternately arranged. In order that the machine may work automatically, irrespective of the arrangement of the slip sheets and the printed sheets, it is necessary that the thickness of one set of sheets differs from that of the other. The present mechanism will be described, merely by way of example, as operating upon slip sheets which are thicker than the printed sheets.

As the sheet reaches the drop and feed rollers 9 and 10, it passes between the elements 11 and 12 of the calipering device. One element of the calipering device controls an air vent 13 in a suitable pneumatic system, not part of the present invention and therefore not shown in this application, but clearly shown and described in my said copending application.

Referring especially now to Figs. 1 to 4, sleeve 25 of the calipering device is adjustably secured to the supporting member or rod 26, which is connected with the stationary framework. This sleeve 25 supports the bifurcated guides 27 between which is trunnioned at 28, the caliper element 11. Integral with caliper element 11 is the upwardly extending arm 29, controlled by the spring 30 and having the surface portion 31 adapted to engage and close the end of nozzle or air vent 13. By suitable adjustment of the guide 27, which is secured by the graduated nut 32, threaded on the rod

26, the required space between the caliper elements 11 and 12 is secured.

The spring 33 is provided within the rod 26 and pressed upon the lower part of the sleeve 25, and serves to take up all play between the adjustable nut 32, the rod 26 and the sleeve 25.

The spring 30 normally maintains the part 31 of arm 29 against the end of nozzle 13. It will be noted that the nozzle 13 serves as a stop for the arm 29, and consequently for the calipering element 11.

In the position of arm 29 resting against nozzle 13, by a suitable adjustment of sleeve 25, a sufficient clearance is provided between the caliper elements 11 and 12 for the passage therebetween of the thinner of the two sets of sheets, whereas when a thicker sheet, for example a slip sheet, is presented to the calipering elements, there is not sufficient clearance, while the said caliper elements are in said normal position. The result is that by the engagement of the movable caliper element by the thicker sheet, said element is moved into the position shown in Fig. 3, carrying part 31 of arm 29 away from nozzle 13 and thereby opening said nozzle vent 13.

The spring 30 is connected at its upper end to the pin 34, which is slidably mounted for the purpose of adjusting the tension of the spring. The spring 30 is connected at its lower end with the arm 29 and, as stated above, normally maintains the part 31 of arm 29 against the end of nozzle 13, and hence normally maintains the caliper element 11 in its lowest position. It should be noted also, that spring 30, due to the direction of its pull or tension maintains the trunnions against the upper surfaces of their bearings and thus takes up all possible play of the caliper element.

I have shown the sheet switching element 14 in Figs. 1 and 6, as an example of the useful application, of the pneumatically actuated mechanism automatically controlled by calipering means, affected by the differences in the thickness of the sheets operated upon.

The switch 14 is capable of two positions, that shown in Fig. 1 and that shown in Fig. 6. The position of the switch is controlled by any suitable pneumatically operated means, not shown or claimed in this application, but fully described in my said copending application. It will be understood however that whatever the pneumatically operated mechanism employed for controlling the position of switch 14, the operation of such mechanism is controlled by controlling the vent of nozzle 13 of the caliper as above described. It will therefore be clear that depending upon whether or not the sheet is thick enough to actuate the movable caliper element to open the nozzle vent, the travel of the sheet will be as follows:—From the drop and feed rollers 8 and 9 through rollers 15 and 16 on suitable tapes 35 between rollers 17 and 18 to stop 19 whence, according to the position of switch 14, either as in Fig. 1 over the incline 20 of the switch 14 and rods 21 and beneath the tapes 40; or, when switch 14 is in the position shown in Fig. 6, the sheet is deflected between the switch and roller 18 and between rods 23 and 24. As the sheets pass through the drop and feed rollers 15 and 16 they are carried along the tapes 35 beneath the rods 36 toward the drop and feed rollers 17 and 18 and the stop 19. In order however to reduce the speed of travel of the sheets along tapes 35 just prior to their striking the stop 19, I provide the following mechanism:—The wheel 37 is provided with a projection 38, with which projection the wheel 39 is adapted to coöperate. Wheel 39 is preferably mounted on a spring controlled support, as shown in Fig. 7, and provided with a yielding surface having suitable frictional qualities, such as rubber. The diameter and speed of revolution of wheel 37 are so related that the projection 38 will engage each sheet against the wheel 39, just previous to the front edge of the sheet reaching the stop 19, so as to reduce or check the speed of the traveling sheet just prior to its engagement with said stop 19, in order to prevent injury to the sheet or the violent rebound thereof. Upon reaching the stop 19, the sheet is brought into proper register and then carried either over the incline surface 20 of switch 14 or between surface 22 of the switch and roller 18, as above described.

What I claim is:—

1. The combination with sheet feeding means of slow down means for checking the speed of travel of the sheets comprising coöperating rotative elements, one resiliently supported and the other provided with a projection adapted with each rotation thereof to engage the sheet against the periphery of the idler.

2. A calipering device for sheet delivering control, comprising fixed and movable calipering elements between which the sheet travels, a vertically extending stationary supporting rod, a vertically extending sleeve supported thereon and supporting a calipering element, and means for securing relative vertical adjustment between the sleeve and the rod.

3. A calipering device for pneumatic sheet delivery control comprising normally fixed and movable calipering elements between which the sheet travels, a fixed hollow rod, a sleeve adjustably secured to the hollow rod and supporting a calipering element and means for adjusting the position of the

sleeve on the hollow rod, comprising an adjusting nut and a spring operating between the rod and sleeve to take up wear or lost motion.

4. A calipering device for pneumatic sheet delivery control comprising normally fixed and movable calipering elements between which the sheet travels, a fixed hollow rod, a sleeve adjustably secured to the hollow rod and supporting a calipering element and means for adjusting the position of the sleeve on the hollow rod, comprising a graduated adjusting nut operating between the rod and sleeve.

5. A calipering device for pneumatic control of sheet feeding machines, comprising coöperating calipering elements, one element being pivotally mounted and having integral therewith a nozzle closing member, and a spring for normally controlling the pivotally mounted element and adapted to maintain the same with the upper side of the pivot against the upper side of its bearing.

6. In a calipering device for sheet delivery control, the combination of a supporting member provided with a recess, a sleeve about said member, a guide connected with the sleeve, a caliper element connected with the guide, a spring within the recess in the supporting member and operating between said member and the sleeve, and means for adjusting the sleeve relatively to the supporting member.

7. In a calipering device for sheet delivery control, the combination of a supporting member, a sleeve adjustably connected therewith, a spring between the supporting member and the sleeve, a bifurcated guide connected with the sleeve and a caliper element connected with the guide.

8. In a calipering device for sheet delivery control, the combination of a supporting member and a coöperating sleeve member, one of said members being normally fixed and the other relatively movable with respect thereto, a caliper element operatively connected with said movable member, means operatively mounted on one member and engaging the other member for causing the relative vertical adjustment therebetween, and means for taking up play between the adjusting means and the parts controlled thereby.

9. In a calipering device for sheet delivery control, the combination of a supporting member and a coöperating sleeve member, one of said members being normally fixed and the other member being relatively movable with respect thereto, a caliper element operatively connected with one of said members, a nut secured to the other of said members and means for taking up play between the parts.

10. In a calipering device for sheet delivery control, the combination of a normally fixed supporting member and a coöperating sleeve member having a spring-controlled relative adjustment with respect thereto, and a caliper element connected with the sleeve member.

11. In a calipering device for sheet delivery control, the combination of a normally fixed member, a coöperating relatively movable member, a bifurcated guide connected therewith, a caliper element movably connected with the guide and provided with a rigid extension, and spring means connected with said extension for normally maintaining the caliper element in position to be actuated by the advancing sheet.

12. In a calipering device for sheet delivery control, the combination with an air vent, of a pivotally supported calipering element provided with an extention, spring means for maintaining said extension in operative engagement with the air vent and against its pivot bearing, to prevent lost motion, and means for varying the spring tension.

13. In a calipering device for sheet delivery control, the combination with an air vent, of a movable calipering element provided with an extension, and adjustable means for controlling said extension relatively to the air vent comprising an adjustable pin and a spring between the pin and said extension.

14. A calipering device for sheet movement control, comprising calipering elements flanking the path of travel of the sheet, a stationary support, a sleeve movable therealong and supporting a calipering element, and means for adjusting the position of the sleeve along said support to vary the distance between the calipering elements.

15. In a sheet feeder and distributer, the combination of feed rollers, carrying tapes and stops, two coöperating slow down elements, one at either side of the path of travel of the sheets, one of said elements adapted to travel at a slower speed than that of the feed rollers and carrying tapes, said element provided with a projection adapted to coöperate with the other slow down element to check the speed of travel of the sheets just prior to their engaging the stop, one of said coöperating slow down elements being resiliently supported.

16. In a sheet feeder and distributer, the combination of feed rollers, carrying tapes and stops, two coöperating slow down elements, one at either side of the path of travel of the sheets, one of said elements adapted to travel at a slower speed than that of the feed rollers and carrying tapes, said element provided with a projection adapted to coöperate with the other slow down element to check the speed of travel of the sheets

just prior to their engaging the stop, the other of said coöperating slow down elements provided with a yielding surface or periphery having suitable frictional qualities.

17. The combination with sheet feeding means of coöperating slow down elements in the path of travel of the sheets, comprising a pair of rollers, one driven at a speed below the normal speed of travel of the sheet and provided with a projection extending beyond its periphery, the other element resiliently supported and having a yielding peripheral surface.

HOWARD K. KING.

Witnesses:
MAE HOFMANN,
HOWARD S. OKIE.