June 4, 1940. H. K. KING 2,203,531

BANK FEED

Filed Oct. 20, 1939 3 Sheets-Sheet 1

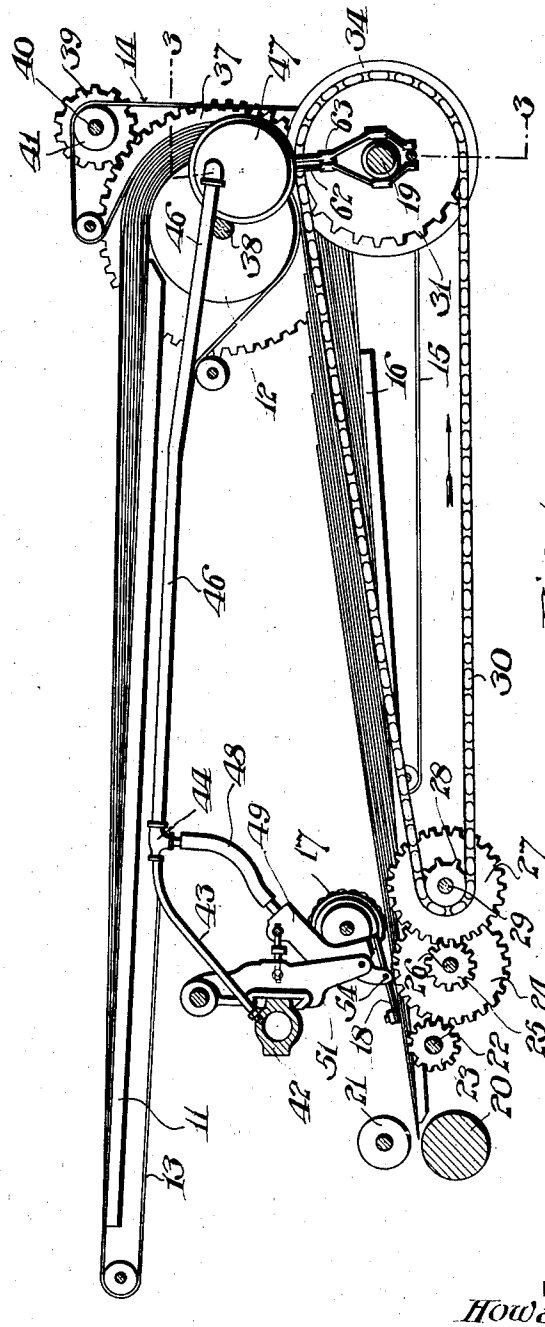


Fig. 1.

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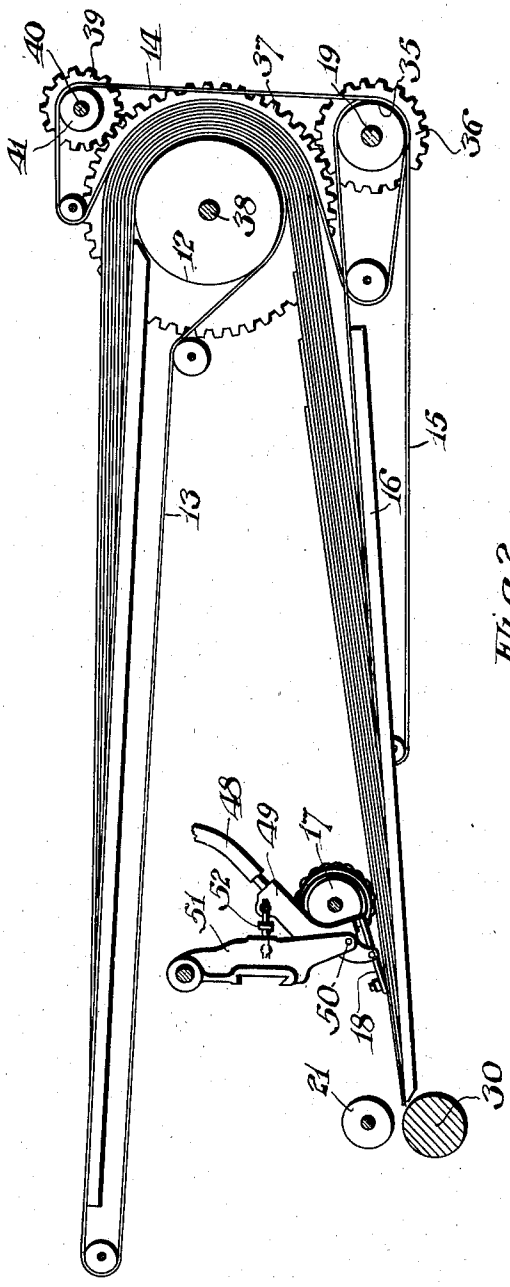


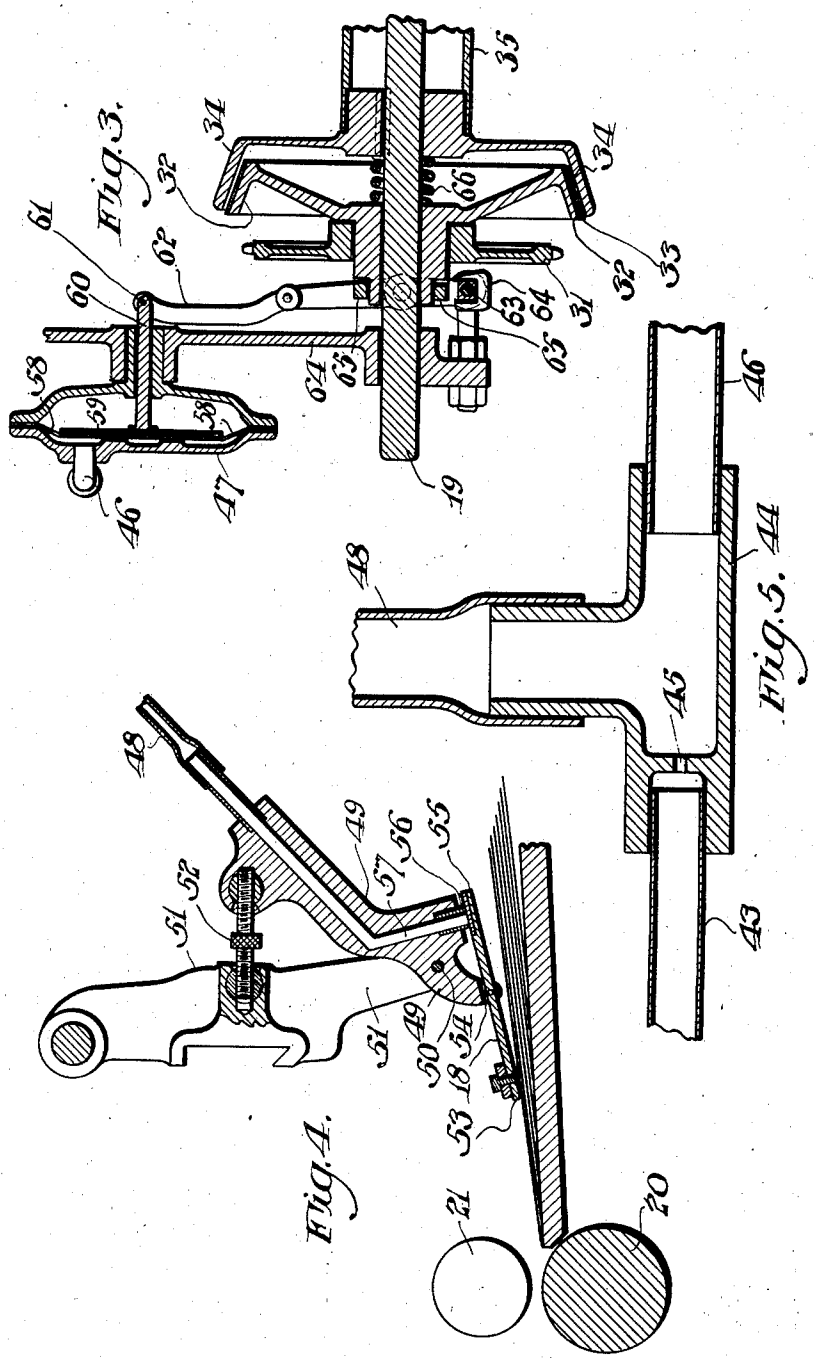
Fig. 2.

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Patented June 4, 1940 2,203,531

UNITED STATES PATENT OFFICE

2,203,531

BANK FEED

Howard K. King, Philadelphia, Pa., assignor to Chambers Brothers Company, a corporation of Pennsylvania

Application October 20, 1939, Serial No. 300,309

5 Claims. (Cl. 271—38)

The invention relates to improvements in bank feed for continuous sheet feeding machines.

The object is to provide improved means whereby the bank feed is secured which closely approaches continuous action. In accordance with the now common practice this action is intermittent.

In accordance with the present invention a predetermined thickness of paper is maintained at a desirable distance back of the front edge of the feathered bank. This distance may vary substantially without adversely affecting the operation. The distance may be arbitrarily selected and no adjustment of the distance is deemed necessary.

The feathered bank is wedge-shape and runs under a hinged or pivoted finger, which calipers the thickness of the paper between the end of the finger and the feed board.

The caliper is manually adjustable and can readily be set to keep the desired numbers of sheets under the caliper. A slowly driven friction clutch member is adapted to communicate the motive power for rotating the drum that feeds the bank forward. When there is sufficient pressure on this clutch member, the bank feeding drum revolves and the bank feeds forward continuously until interrupted by the release of the clutch. The lifting of the caliper by the paper causes this release. Air pressure, from any constant source, upon a diaphragm, acting through a suitable lever, causes the engagement of the clutch. A light air pressure is sufficient, but this pressure should be uniform. In the pipe or passage from constant air pressure source to the diaphragm is provided a restricted air passage. Between this point and the diaphragm is a branch pipe line running to the caliper device and ending in a large nozzle, which is adapted to be opened to the atmosphere. This nozzle is kept closed or nearly closed, as the case may be, by the rear end of the caliper bar. This bar is pivoted at a point between the end intended to rest on the paper and the end adapted to bear against and close the nozzle. Within reasonable limits, the greater the difference in area of the restricted passage and the nozzle opening the more sensitive the device will be.

The withdrawal of one sheet should cause forward feed to take place. The driving friction member should be geared to run considerably faster than the driven friction will ever be required to go, if it were run continuously.

The object is to provide means adapted to take care of any sheet or bank thickness, also any size of sheet.

If however, it should be required to have the bank feed practically continuous this object may be accomplished by introducing an adjustable variable speed drive for the driven friction. In this case the speed of the driving friction can be set to be slightly more than that required of the driven friction. Without resorting to this last extreme however, the bank feed may be a very gentle feed.

The weight of the end of the caliper bar, which rests upon the paper, must be heavier than that of the end closing the nozzle, an amount sufficient to close the nozzle against the air pressure. The drawings show the device adapted for use in connection with a continuous combing wheel feeder; however it can be set in any position desired, and adapted to other types of continuous feeders.

Referring to the drawings which illustrate merely by way of example, suitable embodiments of the invention—

Fig. 1 is a side elevation of a continuous combing wheel feeder with the improved bank feed.

Fig. 2 is a sectional elevation showing more clearly the calipering device and the bank feed.

Fig. 3 is a section on line 3—3 of Fig. 1, showing the bank feeding friction and associated parts on an enlarged scale.

Fig. 4 is a vertical section of the calipering device on an enlarged scale.

Fig. 5 is a section through the air pipes, showing the restricted passage, on a still larger scale.

Similar numerals refer to similar parts throughout the several views.

Sheets are placed on the upper feed board 11 in the usual feathered manner, and are carried around drum 12, by the tapes 13 and 14, onto the tapes 15, on the lower feed board 16, and forward under combing wheels 17 and under the caliper bar 18.

This preliminary position of the bank is secured by the operator turning a crank or handwheel on shaft 19. Crank or hand wheel not shown. The operator should stop just before the thin edge of the feathered bank raises the caliper bar 18. If the caliper has been set the correct distance above the feed board, the machine will then automatically take care of the proper feed.

The action of the combing wheels 17 increases the feathered step from the point of combing wheel action to the feed roller 20. The separation will be greatest near the feed roller. The drop roller 21 descends on the feed roller 20 and takes the top sheet away. The cut-outs that cause the combing wheels to rise are not shown.

The cam shaft 22 makes one turn per cycle. The gears between this shaft and feed roller 20 are not shown. On shaft 22 is secured gear 23 which drives gear 24; to gear 24 is secured gear 25, turning on stud 26. Gear 25 drives gear 27. To gear 27 the sprocket wheel 28 is secured, both turning on the stud 29. The chain 30 drives from sprocket 28 to sprocket 31. The sprocket

31 is secured to the hub of friction member 32, see Fig. 3. Friction member 32 is freely mounted on shaft 19 and, when in operation, is slowly turning on this shaft. The driving friction 32 is faced with leather 33 or other suitable material. The driven friction member 34 is secured to and rotatable with shaft 19 and also to the tape drum 35. Gear 36 is secured to and rotates with shaft 19. Gear 36 drives gear 37. This gear 37 is secured to and rotates with shaft 38. To this shaft 38 is secured the drum 12. Gear 37 drives gear 39. This gear 39 is mounted on shaft 40, which, in turn has mounted on it tape drum 41.

These drums 12, 35 and 41 drive the tape lines 13, 14 and 15, which in turn carry the paper as stated.

The air pipe line, as shown in the present example, is connected to a pneumatically operated or controlled feeder; part of the air supply coming through the hollow rail 42. The pipe 43 leads from this rail to the T 44, see Figs. 1 and 5. Within the T 44 is provided the restricted passage 45. Pipe 46 leads from the T 44 to the diaphragm assembly 47. The flexible hose 48 leads from T 44 to the channel 57 of the caliper element 49.

The calipering device is shown in Figs. 1, 2 and 4.

The element 49 is pivotally mounted, at 50, on the combing wheel supporting member 51. The calipering adjustment is controlled by manually operated right and left handed thumb screw 52. One end of this screw is threaded right hand, and the other, left hand.

By the operation of this thumb screw 52, the caliper may be adjusted to be effective on banks of desired thickness. The calipering bar 18 is pivoted, as at 54, to the bracket or calipering element 49, and is adapted to swing freely on this pivot. The calipering end 53, of bar 18 is sufficiently weighted normally to maintain its opposite end 55, in required closing engagement with the air escape nozzle 56, which is provided at the discharge end of the air passage 57. This air passage 57 receives the air under pressure from the flexible hose 48. The caliper 18 which cooperates with nozzle 56, controls the escape of air from the T and consequently from pipe 46.

The nozzle 56 is closed except when opened by the thickness of paper bank passing under the end 53 of said caliper bar 18. An extremely small opening of the escape nozzle 56 will change the pressure in air line 46 sufficiently to effect the operation of the clutch.

As each top sheet is taken away by the feed roller 20 and drop-roller 21, the thickness of the feathered bank of paper under the caliper at 53 is reduced and causes the bank to feed forward the necessary amount.

Means for the automatic control of the bank feeding, are shown in Figs. 3 and 4. In Fig. 3, a pneumatically controlled clutch is shown. Air pressure in pipe line 46 puts pressure on diaphragm 58 and piston 59. Piston rod 60 is pivotally connected at 61 with the clutch engaging lever 62. Lever 62 is pivoted at 63, to a stationary part of the frame 64. Lever 62 is bifurcated and pivoted on either side to collar 65. Collar 65 is freely mounted on the hub of the clutch member 32. Thus it is obvious that pressure at pivot point 61 of lever 62 will put increased pressure on clutch member 32, thus causing its effective engagement with clutch member 34. In order that the clutch may be free from any tendency to grab, the releasing spring 66 is introduced.

In operation; clutch member 32 is constantly rotating, the clutch members 32 and 34 are always in apparent engagement. This engagement is effective during part of the time, and slipping part of the time. Thus as each sheet is withdrawn the bank is fed slowly forward. This speed is determined by the combined effect of the pressure engagement of the friction elements and the speed of driving friction 32. As stated, this friction is run fast enough to cover the range of operating conditions.

What I claim is:

1. Means for feeding a bank of sheets comprising a rotatable drum, means for causing rotation of said drum, including a continuously rotating driving clutch element, and a driven clutch element adapted to have slipping engagement with the driving clutch element, pneumatically operated means for controlling the pressure of engagement of said clutch elements, and a sheet calipering device for controlling the pneumatic pressure.

2. Means for feeding a bank of sheets comprising a rotatable drum, means for causing rotation of said drum, including a continuously rotating driving clutch element, and a driven clutch element, pneumatically operated means for controlling the cooperation of the clutch elements, said clutch elements having a slipping engagement, the pressure of said engagement being responsive to variations in the pressure exerted by the pneumatically operated means.

3. Means for feeding a bank of sheets comprising a rotatable drum, means for causing rotation of said drum, including cooperating friction clutch elements, one clutch element having constant rotative movement, the other clutch element adapted to have slipping engagement therewith, and to approach the speed of rotation of the driving clutch element, with the increasing pressure engagement of the said clutch elements.

4. Means for feeding a bank of sheets comprising a rotatable drum, means for causing rotation of said drum, including a continuously rotating driving clutch element, and a driven clutch element adapted to have slipping engagement with the driving clutch element, pneumatically operated means for controlling the pressure of engagement of said clutch elements, and a sheet calipering device for controlling the pneumatic pressure, said speed of rotation transmitted from the driving to the driven clutch element increasing, with the increase of pneumatic pressure exerted thereon, from zero toward the speed of the driving clutch element.

5. Means for feeding a bank of sheets comprising a rotatable drum, means for causing rotation of said drum, including a continuously rotating driving clutch element, and a driven clutch element, a spring positioned between said clutch elements and tending to cause separation of the same, pneumatically operated means for effecting the cooperation of the clutch elements, which are adapted normally to have a slipping engagement, and a sheet calipering device controlling the pneumatic pressure.

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