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APPARATUS FOR FEEDING BLANKS OR SHEETS

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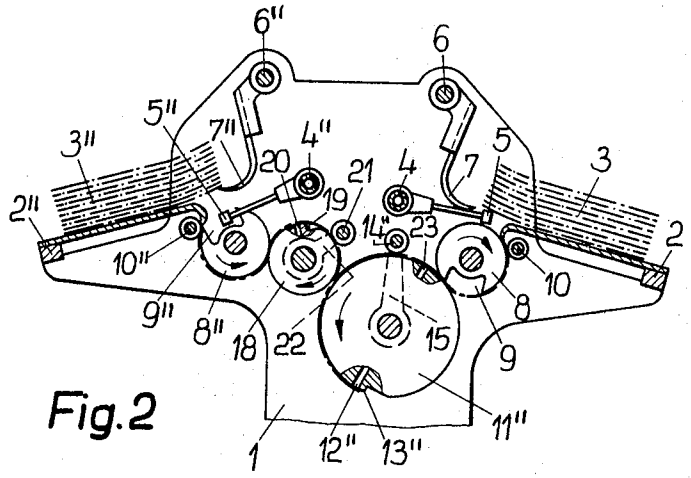


Fig.2

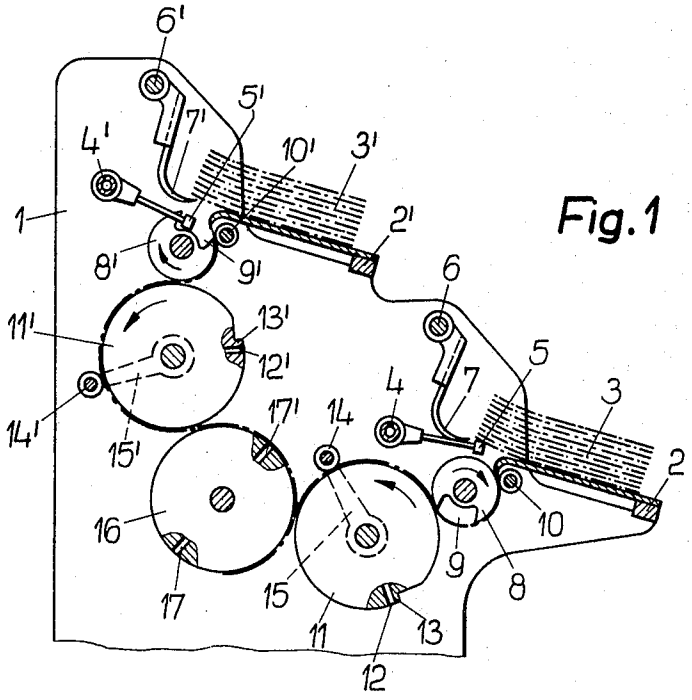


Fig.1

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APPARATUS FOR FEEDING BLANKS OR SHEETS

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U.S. Cl. 271—9 8 Claims

ABSTRACT OF THE DISCLOSURE

Blanks or sheets of paper and the like are fed from the underside of stacks by at least two feeding devices disposed at the input end of a machine processing the blanks or sheets. A sheet is withdrawn from each of the stacks at slow speed and then accelerated by subsequent conveyor means rotating at uniform speed to full speed, whereupon it is fed to the machine, the feeding of the sheets emanating from different stacks taking place at the same reciprocal intervals.

This invention relates to an apparatus feeding blanks or sheets made from paper or the like individually and one after the other from the underside of stacks into a machine for processing them, such as a rotary machine for making envelopes, flat bags or the like, or a rotary printing machine.

Prior art apparatus of this type includes a pivoting suction device and a pivoting tongue cooperating therewith. However, the output of this apparatus is limited since the parts which swing back and forth must move in synchronism with the feeding of the individual sheets, while a certain amount of time is required for attracting by suction and then bending downwardly the bottom-most sheet of a stack of sheets. Thus the output has a maximum limit of about 800 sheets per minute. Attempts to operate the apparatus at a higher speed render it unreliable since the sheets may be shifted or even damaged.

An apparatus using strips unwound from a roll, also known in prior art, has a much greater output. However, apparatus which operates with a stack of blanks previously stamped out to any desired shape has the advantage that it is much more versatile as far as the shape and form of the blanks are concerned and is usually more economical as compared to an apparatus operating with rolls.

Another apparatus known in prior art does not withdraw the bottom sheet from a stack completely, but merely pulls it forward sufficiently to permit the sheets to enter the processing machine in staggered formation. In this apparatus the pivoting suction device also requires time to attract and bend the sheets reliably, so the output of this apparatus cannot be increased beyond about 800 sheets per minute.

An object of the present invention is the provision of an apparatus which will eliminate the drawbacks of prior art constructions.

Another object is to improve the output of an apparatus whtich completely extracts the bottom sheet from under a stack of sheets for transmission to a processing machine.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to provide an apparatus consisting of a plurality, preferably two, feeding devices at the input end of a processing machine. Each device is driven at a fraction of the operational speed of the machine, said fraction corresponding to the number of feeds. The operation is carried out in such manner that a sheet is alternately extracted from each of the feeding stacks at slow speed and is then accelerated to full speed by the following rotary conveyor means, whereupon it is fed to the machine for processing. The speeds of the various feeders are so set in relation to each other that sheets drawn from different stacks one after the other are spaced by the same amount in the machine, as if they were fed into the machine by a single feeder.

The provision of two feeding devices has the advantage that each of them can operate at a speed which provides sufficient time for the front edge of the bottom sheet to be attracted by suction and bent downwardly; thus there can be no shifting from correct position or damage to the sheets due to excessive acceleration, while they are being withdrawn from beneath the stack.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing, showing by way of example, preferred embodiments of the inventive idea.

In the drawing:

FIG. 1 is a diagrammatic longitudinal section through an arrangement of two uniformly directed feeding devices.

FIG. 2 is a similar section through a different embodiment wherein two feeding devices extend toward each other.

Similar parts are designated by the same numerals throughout the drawing.

FIGS. 1 and 2 are both machine sections extending shortly before the plane of the suction devices and of the tongues cooperating therewith.

FIG. 1 shows a rear side wall **1** of a processing machine which is otherwise not illustrated. Two plates **2** and **2'** are firmly fixed to the wall **1**. The plate **2** carries a stack **3** of sheets which are to be fed to the processing machine, while the plate **2'** carries a similar stack **3'**. A suction device **5** is located under the front end of the stack **3** (looking in the direction of feeding), and a similar suction device **5'** is located under the front end of the stack **3'**. The suction device **5** is swingably mounted upon a hollow shaft **4** while the suction device **5'** is swingably mounted upon a hollow shaft **4'**. A tongue **7** mounted upon a shaft **6** swings in synchronism with the suction device **5**. A similar tongue **7'** mounted upon a shaft **6'** swings in synchronism with the suction device **5'**.

Other means for holding the stacks **3** and **3'** which are well known in prior art have not been shown for the sake of clarity of illustration.

A feeder segment **8** rotating in the direction of the arrow is mounted beneath and by the side of the suction device **5**. The segment **8** cooperates with a pressure roller **10**. A segment **8'** cooperating with a pressure roller **10'** is mounted in a similar manner beneath the suction device **5'**. The segments **8**, **8'** have recesses **9**, **9'** and make one revolution for every working stroke of the associated suction devices.

Discs or cylinders **11** and **11'** engage the downstream sides of the segments **8** and **8'**, respectively. The discs **11** and **11'** rotate in directions indicated by the arrows at the same speed of rotation as the segments. However, since the discs have a diameter which is twice as great as that of the segments, they turn at double the peripheral speed. The discs **11** and **11'** have rows of suction apertures **12** and **12'** respectively, which in the direction of rotation are located closely to the so-called gripping edges **13** and **13'**, respectively, which are formed by recesses. Suction air is provided for the apertures for a specific time period once during each revolution of the discs. Presser rollers **14** and **14'** are also associated with discs; they are carried by levers **15** and **15'** respectively, which

are rotatably mounted on the shafts carrying the discs. Thus the presser rollers can be adjusted upon the circumference of the discs so that they will press against the sheets resting upon the gripping edges at precisely the moment when the sheets are released by segments 8 and 8'. Thus a slip-free transportation and acceleration of the sheets is attained at twice the speed.

FIG. 1 also shows a cylinder 16 which is spaced from the discs 11 and 11' by a disance equal to the thickness of the piece of paper which is being transported. The cylinder 16 has the same diameter as the discs 11 and 11' and rotates at the same speed. The cylinder 16 has two opposed rows of suction holes 17 and 17'.

It is apparent that in operation, sheets are withdrawn alternately from the bottoms of stacks 3 and 3' by the suction devices 5 and 5' at slow speed and are then accelerated by discs 11 and 11' rotating at uniform speed. The suction holes 17 of the cylinder 16 take from the disc 11 a sheet fed from the stack 3, while the suction holes 17' take from the disc 11' a sheet fed from the stack 3'.

The cylinder 16 can be, for example, a printing cylinder of a printing unit of a processing machine which is not further illustrated.

FIG. 2 shows a construction wherein the two feeding devices are directed toward each other. The first feeding device has the same parts arranged in the same manner as those shown in FIG. 1, namely, a suction device 5, a tongue 7, and a segment 8. The second feeding device has a plate 2'' carrying a stack 3''. The suction device 5'' is directed away from the suction device 5 and mounted upon a shaft 4''. A tongue 7'' is mounted on the shaft 6''. A segment 8'' with a recess 9'' cooperates with a pressure roller 10''. These parts of the second feeding device are the same as those of FIG. 1, but are differently arranged, as illustrated in FIG. 2. Furthermore, the segment 8'' is followed by a disc 18 which is also located close to the disc 11'' and serves as a substitute for the discs 11' and 16 of the construction of FIG. 1. The discs 18 has the same diameter as the segment 8'' and is rotated at twice the speed in the direction shown by the arrow. The disc 18 has a gripping edge 19 and suction holes 20 situated closely behind the edge 19.

Obviously, several such discs 18 may be located one next to the other.

A presser roller 21 carried by a lever 22 is associated with the disc 18 and is adjustable upon the circumference of the disc 18.

In the construction of FIG. 2 the disc 11'' which replaces the disc 11 of FIG. 1, in addition to the gripping edge 13'' and suction holes 12'' is also provided with a row of suction holes 23 located opposite the suction holes 12''.

In actual practice the use of a small disc 18 rotating at twice the speed of the segment 8'' makes it possible to construct the disc 11'' as a printing cylinder which cooperates with a printing unit (not shown) located directly below the disc 18.

In operation, suction air is fed to the suction holes 20 of the disc 18 only during every second rotation of the disc. The disc 18 accelerates to twice the speed a sheet drawn from the stack 3'' and taken over by the segment 8''. The suction holes 12'' of the disc 11'' take from the segment 8'' a sheet fed from the stack 3 and in conjunction with the gripping edge 13'' and the presser roller 14'', they accelerate it to twice the speed, or the suction holes 23 take over from the disc 18 a sheet which has already been accelerated by it to twice the feed-in speed.

The arrangement of the two feeding devices shown in FIG. 2 has the advantage of a low structural height above the cylinder 11'' which cas be used as the printing cylinder, as compared to the substantially greater structural height above the cylinder 16 which can be also used as the printing cylinder, in the embodiment shown in FIG. 1. The feeding devices of FIG. 2 are better accessible. It should be noted, however, that the sheets of the stack 3'' must lie with their top surface downwards so that the sheets fed in from the two stacks 3 and 3'' will come to rest on the cylinder 11'' in the same way, with their top surface upwards.

It is apparent that the examples described above have been given solely by way of illustration and not by way of limitation and that they are capable of many variations and modifications within the scope of the present invention. All such variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. An apparatus for feeding blanks and sheets from stacks to the input of a processing machine, said apparatus comprising at least two feeding devices for feeding sheets from separate stacks, each of said feeding devices comprising a swinging suction device engaging and withdrawing the bottom sheet of a stack, a rotary feeder segment receiving said bottom sheet, and a pressure roller engaging said segment, said segment feeding said sheet at the speed of one revolution for one stroke of the suction device; and a separate rotary conveyor engaging each segment, receiving said sheet from said segment and feeding it to the input at a speed which is a multiple of the speed feed of said segment.

2. An apparatus in accordance with claim 1, wherein the conveyor has at least one suction hole and a gripping edge located in the direction of rotation in front of said suction hole, and a presser roller associated with said conveyor.

3. An apparatus in accordance with claim 2, wherein the two feeding devices are located in identically oriented positions.

4. An apparatus in accordance with claim 3, comprising a single cylinder receiving the sheets from the rotary conveyors of the two feeding devices.

5. An apparatus in accordance with claim 3, wherein each conveyor has twice the diameter of said feeder segment, the rotary conveyor and the feeder segment being adapted to have the same speed of rotation.

6. An apparatus in accordance with claim 2, wherein the two feeding devices are located in oppositely oriented positions.

7. An apparatus in accordance with claim 6, wherein one of said conveyors constitutes a working cylinder of said processing machine.

8. An apparatus in accordance with claim 7, wherein one conveyor has twice the diameter of the cooperating feeder segment and being adapted to have the same speed of rotation as the feeder segment, the other conveyor having the same diameter as that of the cooperating feeder segment and being adapted to have twice the speed of rotation of the feeder segment.

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