ABSTRACT: A novel apparatus is disclosed for feeding and removing flat items such as paper sheets, letter envelopes or paper strips, into and from a processing machine such as an addressograph. The novel apparatus is characterized by the features that transporting means are provided to remove the flat items subsequent to processing thereof in a cyclic or rhythmic fashion and in a direction counter to their feeding direction.
APPARATUS FOR FEEDING AND REMOVAL OF FLAT ITEMS INTO AND FROM A PROCESSING MACHINE

This invention generally relates to a feeding apparatus and particularly concerns an apparatus for both feeding and removing flat items such as paper sheets, letter envelopes or paper strips, into and from a processing machine such as an Addressograph.

The instant invention contemplates, as a primary object thereof, the solution to the problem associated with processing machines such as an Addressograph relating to accelerating, feeding, and removing of such flat items. A further object of the subject invention is the provision of an apparatus for feeding and removing such flat items which functions in an automatic fashion to thus eliminate the need for individual manual insertion.

These as well as other objects which will become apparent as the description proceeds, are implemented by the subject inventive apparatus which is characterized by the features that the apparatus includes a transporting means for removing the flat items subsequent to processing thereof, the removal taking place in a cyclic or rhythmic fashion and in a direction corresponding to the feeding direction of the items. As will be apparent, the provision of such a relatively simple means makes it possible to achieve a substantially higher production speed than was previously the case with manual insertions, and enables quick changes to other formats or other item thicknesses.

The invention itself as well as further advantageous features thereof will be better understood from the following detailed description of preferred embodiments, such detailed description making reference to the appended drawings, wherein:

FIG. 1 is a sectional view taken through the novel apparatus comprising the subject invention taken along the lines I-I of FIG. 3;

FIG. 2 is a side elevational view of the apparatus comprising the subject invention taken in the direction of the arrow A of FIG. 3, and,

FIG. 3 is a front elevational view of the novel inventive apparatus taken in the direction of the arrow B of FIG. 2.

Referring now to the drawings, the novel apparatus is seen to be equipped with two vertical, plate-shaped sideplates 2 disposed at a distance from each other by means of rods 3. A rotatable, tilting table 4 is mounted between the two sideplates 2, the table being pivotally mounted about a horizontal rotating bolt 5 and rotated through the turning of a head screw 6. Table 4 is provided to receive a stack 46 of flat items to be subsequently addressed or otherwise processed, the flat items preferably comprising letter envelopes, paper sheets, newspapers or the like. The items are laterally guided on the table 4 by means of adjustable stop and sheet plates such that, through a simple adjustment, the format can be changed. The stacked flat items which inherently possess a certain stiffness are moved forwardly single and successively, one after the other, by means of a separator device 7 having a housing 50 pivotally mounted on the shaft 3 and which is described hereinafter in greater detail.

A soft rubber strip 8 is transversely mounted on the table 4 so as to forwardly transport, in each instance, only a single item. The soft rubber strip 8 has a relatively greater frictional resistance which is greater than the frictional resistance of the flat items on the table 4 and which is further greater than the frictional resistance of each of the items stacked on top of one another. As a result thereof, only the uppermost item of the stack 46 can each successively pass through a roller 35 and the soft rubber strip 8.

A first shaft 10 having transport wheels 11 disposed thereon is provided at the front end of the table 4. The surface of the transport wheels 11 is equipped with rubber rings or bands for increasing the gripping ability thereof. A second shaft 12 is disposed rearward and in parallel relation to shaft 10 and is likewise equipped or provided with transport wheels 13, 15. At least two of the transport wheels 11, 13 contact or come to lie against each other with their respective rubber layers such that the transport wheels 11, 13 rotate with each other together with shafts 10, 12.

The novel apparatus is set into motion by means of an electric motor 17 via a gear belt 18 running on a wheel 20 disposed on the shaft 12. An endless rubber band or belt 21 is respectively disposed around both rollers 15, the rubber bands or belts 21 being led, in the rear of the apparatus, around respective reversal rollers 22. The lower side of the rubber band or belt 21 runs closely above the surface 23 of the underlying table such that a flat item lying on the table surface 23 which lies within the range of the band roller 15 is taken up and along by the belt 21 in the direction of arrow C and is transported to the rear of the novel apparatus by sliding along on the table surface 23. A microswitch 38 is disposed beneath the tilting table 4 and has an activating lever 39 extending into the area between the two roller pairs 11, 13. Microswitch 38 is itself electrically connected with an electromagnet 31 to be discussed below.

The entire unit is provided with 4 feet 24 and rests on the table surface 23 of a processing machine such as an Addressograph. An electromagnet 25 is placed an adjustable distance in front of the novel inventive apparatus on the surface 23 of the processing machine table 23. The electromagnet 25 is connected with a plunger 26 of the electromagnet 25. When current is applied to the electromagnet 25, the plunger 26 performs a movement in the direction of arrow E. As shown, the casing of electromagnet 25 is secured to the machine table, preferably by means of nonillustrated permanent magnets, such that the position of the electromagnet 25 can be easily changed if the format of the items to be processed changes.

Referring specifically now to FIG. 2, the intermittent or cyclical drive for the separator mechanism 7 is initiated from a gear belt 18 when the gear belt 18 is pressed against a friction wheel 30 via an angle arm or lever 28 associated with electromagnet 31 and a roller 29. Thus, friction wheel 30 is entrained as soon as current is applied to the electromagnet 31. As shown, electromagnet 31 is mounted externally on the side plate 2 by means of an angle piece 32.

The novel apparatus of the subject invention operates in the following manner. The items to be processed, such as letter envelopes to be provided with addresses, are initially placed on the tilting table 4 in a stack 46. An electrical impulse, which may be the shock of the merchandise, or periodically or periodically provided from the processing machine itself, sets the separator mechanism 7 into operation in that current is applied to the electromagnet 31 and, as a result thereof, the gear belt 18 presses against the friction wheel 30 thus setting friction wheel 35, intermediate wheel 36 and transport wheel 37 into rotation wheels being supported at the housing 50. Accordingly, the uppermost of the flat, stacked items 46, is taken up by the wheel 37 and is initially transported in the direction of arrow F until the time wherein the flat item reaches the space between the transport wheel pairs 11, 13. The item is then taken up by these transport wheel pairs 11, 13 and is transported further such that the item finally comes to rest on the table surface 23 and pushes against the slide 27 or some other suitable stop. The actual processing operation on the flat items takes place in this position on the table surface 23, the processing operation comprising an addressing step, for example, through the utilization of a head 40 depicted in dotted lines which can be moved up and down. However, it is to be understood that other operations, such as gluing, impressing, stamping or shearing and the like can likewise take place.

As soon as the head 40 has returned to its initial or rest position, the processing machine would provide a further electrical impulse which applies current to the electromagnet 25 actuating the electromagnet 25 and causes slide 27 thereof to move in the direction of arrow E and thereby push the item located on the table surface 23 into the clearance between roller 15 or belt 21, respectively, and the table surface 23. Since roller 15 is run continuously, the item would then be
transported in the direction or arrow E to the rear of the novel apparatus. Electromagnet 31 would also receive current simultaneously with the current fed to electromagnet 25 such that the separator mechanism 7 begins to rotate again. Thus, two items would move at the same time, one item being fed to the processing machine, the other item being removed from the processing machine, the items moving in opposite directions to each other without causing any disturbance with respect to each other.

The item which has been transported away by the belt 21 in the direction of arrow C is collected at the rear of the apparatus, that is, at the right side of the apparatus as depicted in FIG 1 by a suitable receiving container 31. Microswitch 38 effectuates interruption of the current to the electromagnet 31 and causes electromagnet 31 to become deenergized or fall off when the item has been gripped by the transport rollers 11, 13.

Interruption of the current is effected by actuating the lever 39 of the microswitch 38. Accordingly, the transport function of the separator mechanism 7 is interrupted until a further new impulse is provided from the head 40 or another part of the processing machine whereupon the described operational cycle repeats itself. The relatively brief electrical impulses given or provided by the processing machine are conducted to a relay which is equipped with a self-holding switch causing the relay to be pulled up until such time as the circuit is again opened by microswitch 38.

The distance between the tilting table 4 and the rollers 35 to 37 of the separator mechanism or means 7 can be adjusted to the thickness of the item to be processed during each operation through turning of the screw 6 described above. So as to ensure that the transport takes place without disturbance in the case of relatively long items, a nonillustrated overriding clutch in the form of a ratchet wheel, for example is built into the roller 35, the overriding clutch entering into action as soon as the item is gripped by transport rollers 11, 13, and roller 35 is no longer driven after the electromagnet 31 has fallen off. The refilling of the stack 46 can take place by merely rotating or lifting the separator mechanism 7 upwardly around the shaft 3, for example, whereupon a new supply can be placed upon the remaining stack 46 of items.

As should now be apparent, the objects initially set forth at the outset of this specification have been successfully achieved.

What I claim is:

1. An apparatus for feeding and removing flat items such as paper sheets, cardboard, letter envelopes or paper strips one by one into and from a processing machine, such as an addressing machine, said apparatus comprising:
   table means for carrying a supply stack of flat items;
   a set of intermittently driven separator rollers arranged above said table means and acting on the top of said supply stack and cooperating with friction retaining means arranged below and beneath the foremost roller of said set of separator rollers for separating said items successively one after the other, said retaining means preventing double-feed of the items during the separation of the items individually from the supply stock;
   means for driving at least one of said separator rollers, driven transport rollers spaced from the separator rollers in the transport direction of said items;
   control means for controlling the rotation of said separator rollers so that they are positively driven until the item is gripped by said transport rollers, said control means containing an actuating lever of a switch, said lever extending into the area of the transport rollers, said switch being connected with an electromagnet means so that the driving connection for the driven separator roller is interrupted as soon as an item is gripped by said transport rollers;
   a machine table containing a processing area for said processing machine; and
   means for removing said items along said machine table in operational rhythm after processing thereof;

2. An apparatus as claimed in claim 1, where said table means comprising a belt by means of which frictional contact is made with said driven feeder roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

3. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven feeder roller, said drive means comprising a belt by means of which frictional contact is made with said driven feeder roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

4. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven feeder roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

5. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven feeder roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

6. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven feeder roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

7. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven feeder roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

8. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

9. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

10. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.

11. An apparatus as claimed in claim 1, wherein said set of separator rollers includes a driven feeder roller, drive means for said driven roller, said drive means comprising a belt by means of which frictional contact is made with said driven roller, said belt further driving one of said transport rollers, and lever means actuated by an electromagnet for causing said frictional contact.