

Sept. 4, 1956

G. X. LENS

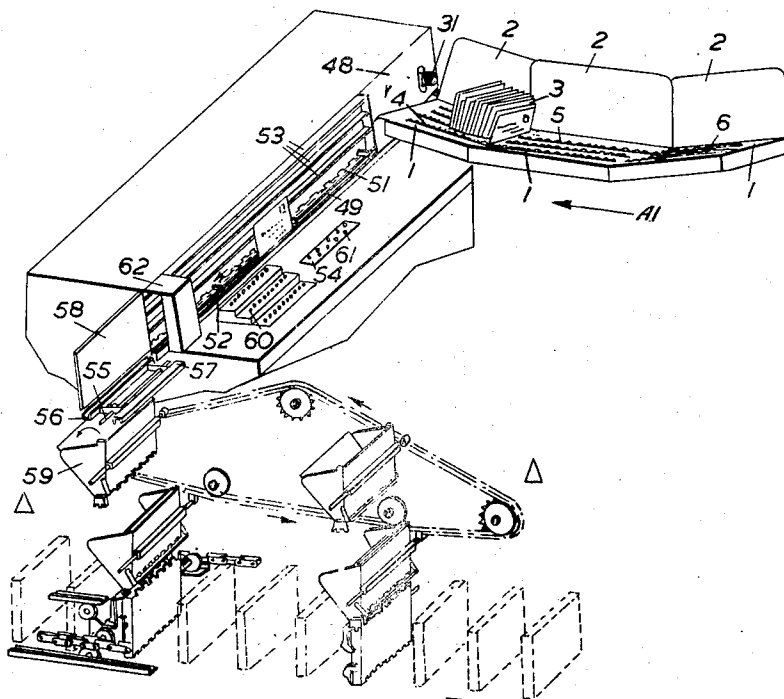
2,761,680

FEED MECHANISM FOR LETTERS OR SIMILAR FLAT OBJECTS

Filed Dec. 18, 1951

5 Sheets-Sheet 1

FIG. 1.



Inventor

G. X. LENS

By *Robert N. Harding Jr.*
Attorney

Sept. 4, 1956

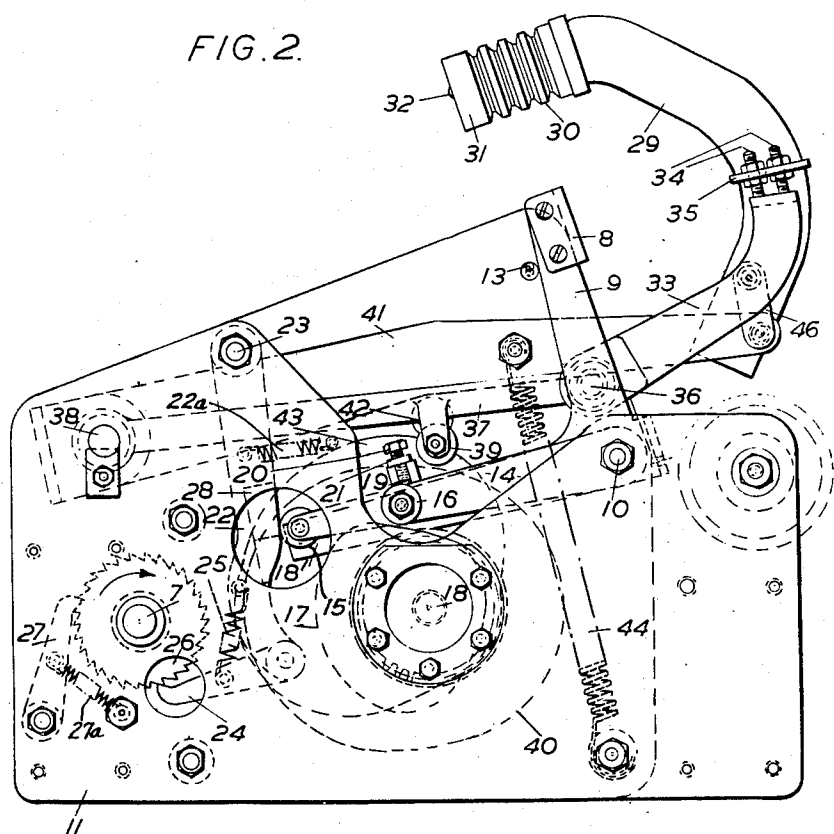
G. X. LENS

2,761,680

FEED MECHANISM FOR LETTERS OR SIMILAR FLAT OBJECTS

Filed Dec. 18, 1951

5 Sheets-Sheet 2



Inventor
G. X. LENS

By *Robert Harding Jr.*
Attorney

Sept. 4, 1956

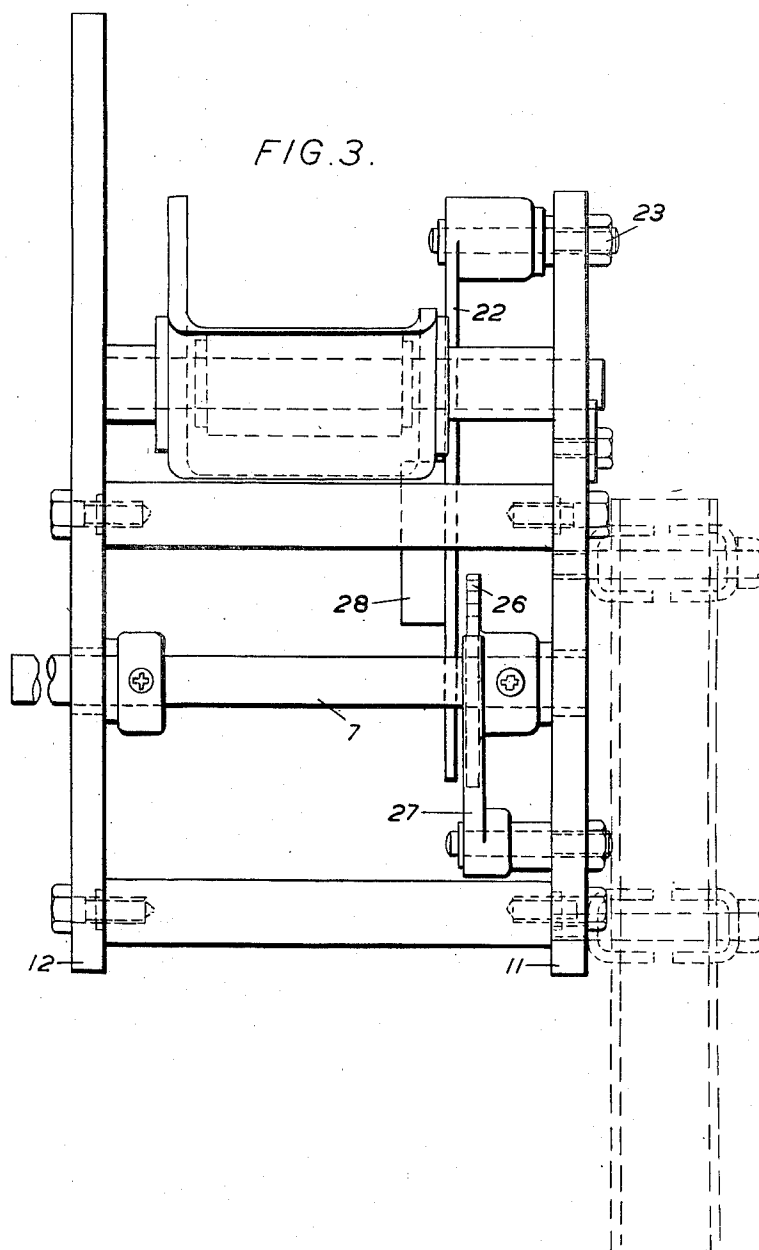
G. X. LENS

2,761,680

FEED MECHANISM FOR LETTERS OR SIMILAR FLAT OBJECTS

Filed Dec. 18, 1951

5 Sheets-Sheet 3



Inventor
G. X. LENS

By *Robert Harding*
Attorney

Sept. 4, 1956

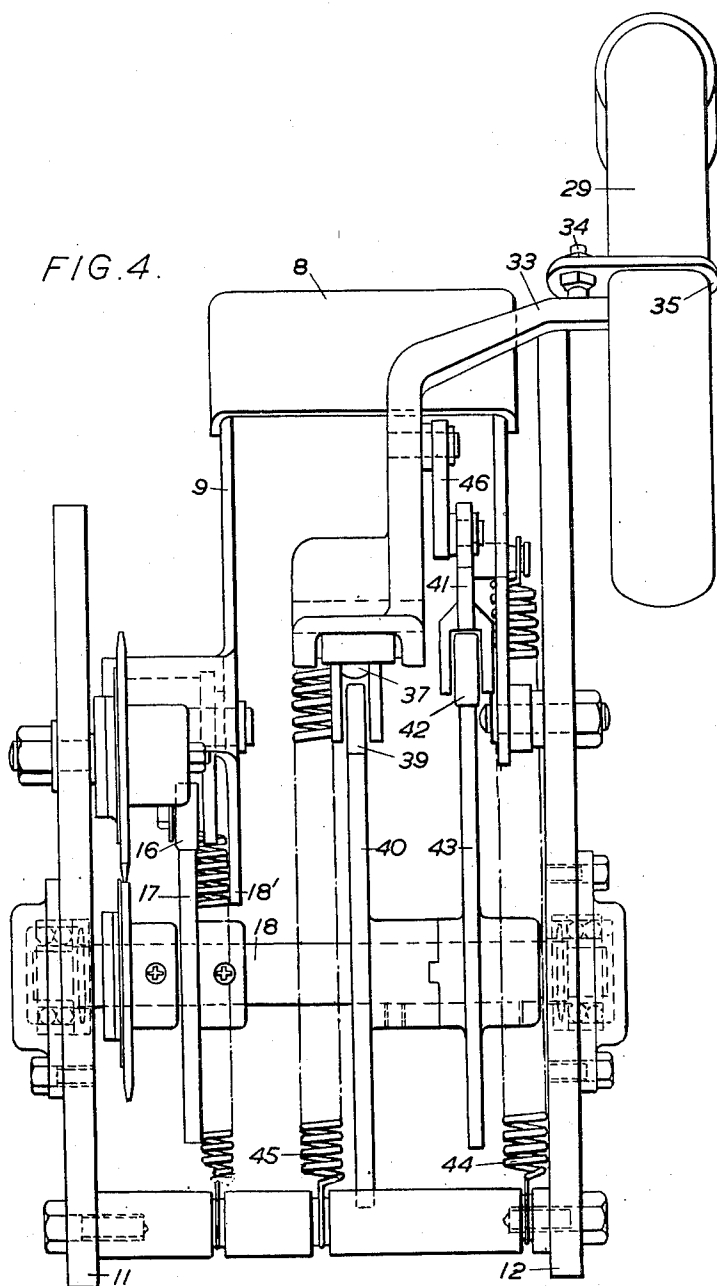
G. X. LENS

2,761,680

FEED MECHANISM FOR LETTERS OR SIMILAR FLAT OBJECTS

Filed Dec. 18, 1951

5 Sheets-Sheet 4



Inventor

G. X. LENS

By

Robert Harding Jr.
Attorney

Sept. 4, 1956

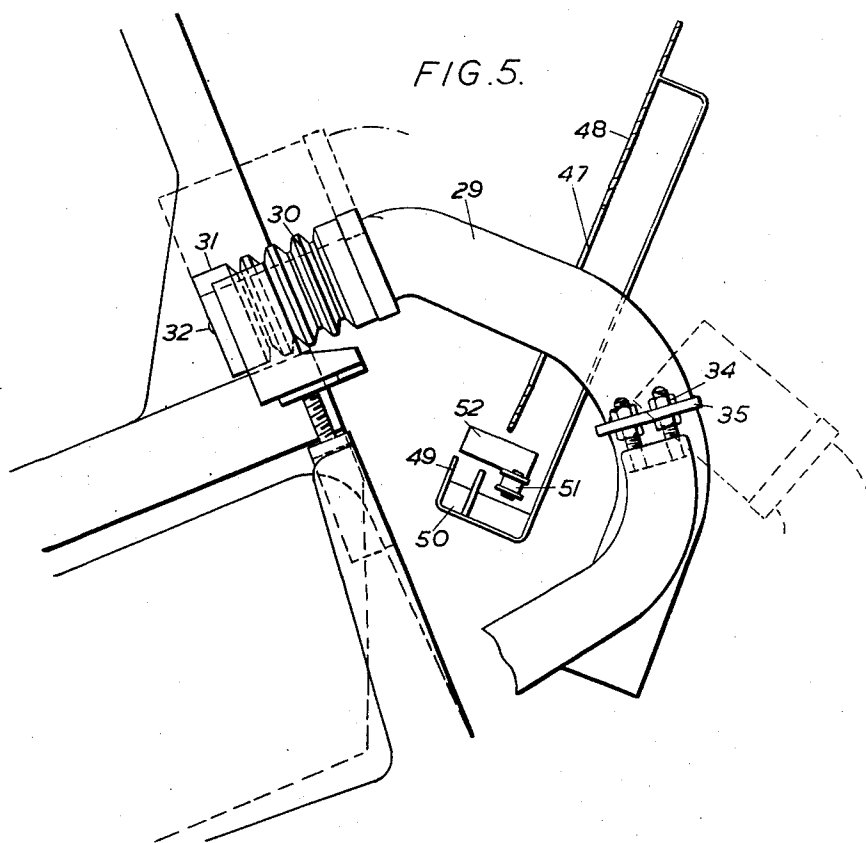
G. X. LENS

2,761,680

FEED MECHANISM FOR LETTERS OR SIMILAR FLAT OBJECTS

Filed Dec. 18, 1951

5 Sheets-Sheet 5



Inventor
G.X.LENS

By *Robert Harding Jr.*
Attorney

1

2,761,680

FEED MECHANISM FOR LETTERS OR SIMILAR FLAT OBJECTS

Georges Xavier Lens, Antwerp, Belgium, assignor to
International Standard Electric Corporation, New York,
N. Y., a corporation of Delaware

Application December 18, 1951, Serial No. 262,208

Claims priority, application Netherlands
December 18, 1950

2 Claims. (Cl. 271—12)

The present invention relates to apparatus used at an operator's sorting position in a system for sorting letters or similar flat objects, more particularly for use in a letter sorting machine.

Usually, a plurality of these sorting positions, each of which is staffed by one operator, are centrally located with respect to a common conveyor chain, conveying the objects to be sorted to each of the receptacles corresponding with the different destinations. An embodiment hereof is described amongst others in Dutch Patent No. 61,887 issued October 15, 1948, in which as a consequence of the special arrangement of the sorting machine, the sorting positions are located on a platform rather high above the floor.

In this well known machine, each sorter receives the letters and other similar mail, these being slid towards him in a pile whereby he has to take up the letters one by one with one hand, then read the address of the destination and subsequently record with the other hand a code number, corresponding to the place of destination, on a keyboard. Finally, he must deposit the letter in a slot allotted for this purpose. All this must be effected within a certain time interval.

An object of the invention is to provide operating mechanism at a sorting position in such a way that the sorter may perform his work without touching the letter with his hand and which serves to move the articles to be sorted one at a time, in front of the sorter.

The speed with which this machine can sort, is largely dependent upon the time required by the sorter to mentally translate the wanted destination into the proper code number and to record it on the keyboard.

In accordance with the invention there is provided an automatic supplying device arranged to advance the objects to be sorted step-by-step in a pile at the desired speed, while furthermore means is provided to automatically take off these objects such as letters one by one from the pile and to deposit them onto a conveying device individual to an operator's sorting position, which successively passes the objects in a preferably rhythmically interrupted movement along in front of the sorting operator. During this movement, the sorting operator scans the destination visually and either with both hands or with one hand, records a code number corresponding to this destination onto a keyboard, while at the end of this conveying device there is provided a transfer mechanism cooperating therewith which transfers the objects from the position in which they were read, one by one periodically to a second and intermediate conveying device, e. g. located below the first one.

Between the device supplying the object and this first mentioned conveying device, a pneumatic suction device is located which takes off the objects one by one by suction and transfers them onto the conveying device.

2

In accordance with the invention, this pneumatic suction device comprises a curved suction tube, terminating into an elastic suction mouth with flat rim, adapted to perform a first pivoting movement in its own plane when sucking on the object, subsequently a translation movement and finally during its return pivoting movement about the meanwhile raised pivoting point, delivers the object onto a slanting receiving surface of the conveying device which surface will remove the object from the suction mouth during the last part of the return movement.

In order to more readily understand the operation of my invention as described in the following description, the objects to be sorted will be called "letters" for convenience, which definition is not meant to be limitative. In the drawings:

Fig. 1 represents a perspective view of the sorting position together with the further conveying device located below same;

Fig. 2 represents a side elevation of the driving device together with the channel and the pneumatic transfer member;

Figs. 3 and 4 represent side elevations of the mechanism shown in Fig. 2 seen from left and right respectively;

Fig. 5 shows the pneumatic transfer member in different positions of the suction mouth.

I. Automatic supplying device with step-by-step driving

Referring now to Fig. 1, this supplying device which in the embodiment to be described is located to the right side of the sorting operator, comprises a plurality of sections joined together at an obtuse angle in which each section is formed by two adjoining surfaces, a carrying surface 1 and a vertical guiding surface 2. In order to move the letters 3 in the direction of the arrow A1, chains or belts 4, 5, 6 are provided as carrying surfaces and if necessary also in the guide surface, parallel to each other and which are advanced step-by-step from a common driving shaft in a manner to be described. The speeds at which the sets of chains are advanced need not necessarily be synchronous.

The sections may be curved to facilitate a bunching of letters conveyed on belts 4, 5, and 6.

When using belts as carrying surfaces these may be advantageously provided with protuberances and such like in order to transport the letters without slippage.

The letters 3 are subjected to basic pre-sorting before they are placed onto the carrying surfaces 1, in that all documents such as letters, postcards, visiting cards, etc. are disposed on the carrying surfaces with the address in the reading position while moreover so called "stop" mail is removed. The expression "stop" mail relates to items whose dimensions exceed predetermined marginal amount and for example are too long, too thick or too heavy to be accommodated by the conveyor apparatus.

The driving shaft for said chains or belts, 4, 5, 6, is rotated step-by-step as indicated in Fig. 2 by 7, while the further coupling to the supply chains 4, 5, 6 is effected via intermediate chains and gear wheels which have been omitted for the sake of simplicity.

The advance of the chains 4, 5, 6 is effected under the control of a scanner 8 which forms the upper arm of a bell crank 9 pivoted on the shaft 10.

This shaft is mounted between two parallel vertical frame plates 11 and 12 as can be readily seen in Fig. 3.

Normally the upper-arm of the bell crank 9 rests against a stopping member 13 which member may be made of sound and shock absorbing material.

A lever 14 pivoted on the shaft 10 carries a roller

3

15 at the left-hand end as well as a second roller 16 at an intermediate point. This last mentioned roller is rhythmically moved up and down with the aid of a first cam 17 secured on a constantly rotating driving shaft 18. The roller 16 rolls along the periphery of the cam 17.

On the top of the lower arm 18' of the bell crank 9 there is provided a boss 19 into which an adjusting screw 20 and lock nut 21 may be threaded. With the aid of this adjusting screw the stroke of the scanner may be accurately set. The bottom of this adjusting screw rests on the upper surface of the lever 14 so that during an upward rotation of the lever 14, the arm 18' of the bell crank is lifted simultaneously thereby rotating the scanner 8 in a clockwise direction away from the stop 13. By reason of the length of arm 18', the weight of said arm normally tends to urge the scanner 8 in a counter-clockwise direction (Fig. 2).

The roller 15 pivoting at the left-hand edge of lever 14 is adapted to roll along the right-hand surface of pawl lever 22. Pawl lever 22 is pivoted on shaft 23 fixed to the frame plate 11 and is provided with a curved portion near its free end and to which there is pivotally attached a pawl 24. Pawl lever 22 is normally urged in a counter-clockwise direction as shown in Fig. 2 by spring 22a which has one end anchored to frame 11 and its other end attached intermediate the ends of pawl lever 22. Thus, spring 22a tends to normally urge pawl lever 22 into contact with the roller 15. A spring 25 is coupled between pawl 24 and pawl lever 22 and tends to normally urge the pawl 24 upwardly in a clockwise direction (Fig. 2) and into contact with the teeth of ratchet wheel 26. The ratchet wheel 26 is fastened to shaft 7 and is adapted to drive same as the pawl lever 22 is reciprocated in a clockwise direction by the means to be hereinafter explained. A check pawl 27 pivotally mounted on frame 11 is maintained against the teeth of ratchet wheel 26 by means of spring 27a and is adapted to prevent rotation of the ratchet wheel in a counter-clockwise direction (Fig. 2).

Intermediate the ends of pawl lever 22 there is mounted a rectangular block 28. The block 28 is mounted at a point opposite the highest point which may be assumed by the arm 18' when the scanner 8 reaches a predetermined clockwise position, which position is away from the stop 13. It will be understood that scanner 8 is moved in the clockwise direction (Fig. 2) away from the stop 13 by the letters 3 which are conveyed thereagainst. Scanner 8 is adapted to halt the transport of letters when it has been displaced from its stop 13 until the suction device to be later described removes the letters which forced scanner 8 in the clockwise direction. As the arm 14 rises cyclically due to the action of cam 17 on roller 16, the roller 15 will urge the pawl lever 22 in a clockwise direction, as explained before. If, however, the scanner 8 is in a clockwise direction so that the member 18' has moved upwardly to a point opposite the block 28, the pawl lever 22 will be held in a fixed position against the end of lever 18' and therefore the roller 15 will be unable to impart motion to the pawl lever. As the scanner 8 falls back in a counterclockwise direction the end of lever 18' is removed from the path of the block 28 and the roller 15 is again enabled to impart motion to the pawl lever 22 and consequently the shaft 7. Thus, the chains 4, 5, and 6 advance in steps so long as scanner 8 is not urged more than a predetermined distance away from the stop 13 by letters fed thereto by the chain 4.

As long as no letters are supplied or the scanner is free to move in a counter-clockwise direction so that the lever end 18' is out of the path of block 28, the movement of the pawl lever 22 will not be hindered and the stepping movement of the chains 4, 5, 6 may be continued.

It is evident that the position of the scanner with respect to the front surfaces 1, 2 and the depth along which the scanner enters into the supply channel may be adjusted within certain limits. It may be noted that the

4

right-hand side of the pawl lever and the left-hand side of the arm 18' are arranged as parts of circle-arcs with respect to the centre line of the shaft 10. This left-hand side of arm 18' however will never come into contact with the side of the pawl lever but may only contact block 28 as hereinabove explained.

II. Pneumatic suction device for the object to be sorted

This pneumatic suction device consists mainly of an elbow shaped suction tube 29 having bellows 30 at the upper end which terminate into a suction mouth 31 having a flat rim. In this suction mouth there is provided a grid (not shown) onto which a small boss 32 is fixed, protruding a very small distance beyond the plane of the rim. The boss is just visible in Figs. 2 and 5 and serves to slightly depress the letters to be attracted so that the possibility of taking off more than one letter at a time is substantially eliminated. The bellows and the suction mouth are made of elastic material e. g. rubber, so that the suction mouth may rest gently against the surface of a letter with a small amount of pressure. A suction pump (not shown), the suction force of which may be preferably adjustable, is connected to the lower end of the suction tube 29 via a flexible hose (not shown). Furthermore, a safety valve (not shown) is inserted in this suction tube. The suction tube is connected to a lever 33 while a setting of the position of this suction tube is possible within predetermined limits with the aid of the screw bolts 34 and a plate 35 provided with a cross-slot. The lever 33 as shown in Fig. 4 is provided with a forked end which extends partially around the shaft 36, and around which it may pivot. Shaft 36 is fixed to the lever 37 and is adapted to rock around the fixed shaft 38 which is provided between the frame plates 11 and 12. This rocking movement is obtained because a roller 39 pivoted on the lever 37 rolls along the periphery of a second cam 40 which is rotated by the shaft 18.

Around the fixed shaft 38 a second lever 41 is pivoted, the rocking movement of which is controlled by a roller 42 which rolls along the periphery of a third cam 43 which is also rotated by the shaft 18. As will be evident from Fig. 2, the cams 40 and 43 are mounted on the shaft 18 in staggered position so that their high points are in different angular positions about shaft 18.

In order to maintain the rollers 39 and 42 on their respective cams, tension springs 44 and 45 are provided, of which the spring 44 is solely visible in Fig. 2. Spring 45 may be seen in Fig. 4. The right-hand end of the lever 41 is coupled to a point on the lever 33 intermediate its ends by means of a link 46 so that a mutually closed moving mechanism 37—41—46—33 is produced.

During a portion of the rotation of the cam 43, the suction tube 29, by means of the roller 42, the lever 41 and the link 46, will perform a first advancing counter-clockwise (Fig. 2) pivoting movement around the shaft 36 and will move toward the front letter of the pile until the suction mouth touches against the letter and lifts it by the suction action.

A rotary movement on itself is however insufficient to take off the letter because the L-shaped scanner 8 has a certain height acting as threshold.

At the moment that the suction mouth 31 comes against the furthest letter, the cam 40 will be rotated so far that the roller 39 is lifted and thus the pivoting point 36 is displaced upwardly. The consequence is that the suction mouth performs a translation movement and the letter is lifted vertically in its plane over the scanner and therefore may be taken off without any interference, while at the same time this lifting of the letter prevents sticking to the adjacent letter next to be lifted.

During the return stroke of the suction tube it performs a rotary clockwise movement around the raised point 36 during which the letter remains retained against the suction mouth by the suction action.

5

Another means to prevent taking off several letters simultaneously has already been mentioned above in connection with the boss 32. Furthermore, air may be blown between the letters through a slot provided in the furthestmost guide surface 2 causing the letters to separate slightly.

The place where the suction mouth contacts the letter has been chosen so, that even the objects of the smallest marginal dimensions such as visiting cards, may be covered by the suction mouth and may be reliably lifted.

The manner in which the pivoting point 36 is raised during the translation movement is not limitative and any other suitable means to achieve such a movement may be used. It is essential however to have a first pivoting movement during which the suction mouth 31 is advanced toward the letter. Subsequently there must be a translation movement to lift the letter over the threshold formed by the scanner. Only thereafter may the return pivoting movement take place to lift the letter by suction.

III. Letter conveying device

The function of this conveying device is to take over the letter which was picked up by the suction device and to lead the letters one by one along the sorter in such a manner that this sorter without taking up the letter has an opportunity to read the address and to record a code number corresponding to the destination onto a keyboard, which code number may be stored electrically, e. g. in a suitable register. Furthermore, the function of this conveying device is to further transfer the letters to another intermediate conveying device located in the vicinity of the sorting position and which intermediate conveying device deposits the letter into a letterholder of the main chain allotted to the sorter.

As shown in Fig. 5, during the last portion of the return pivoting movement cycle of the suction tube 29, this tube retracts itself entirely through an aperture 47 in a slanting surface 48 with the result, that the letter is taken off by this surface from the suction tube. The shape and the dimensions of this aperture have been chosen so that the suction tube may pass unhindered during its go and return movement and that all objects to be sorted, must have dimensions which are larger than the aperture 47.

In addition to the operative position of the suction mouth, Fig. 5 also shows diagrammatically the translation position and the return position.

Subsequently, the letter will rest on its bottom edge in a U-shaped channel 49, in which a slide rail 50 having a smooth surface is provided at the bottom.

Behind the rectilinear channel 49 there is positioned an endless chain 51. At regular intervals fingers 52 are fixed in a transverse direction on the links of this chain and extend transversely across channel 49 and with the aid of these fingers the letters are pushed on during the intermittent movement via the rail 50 in the channel while being supported in their own plane by the parallel guide ribs 53 or ripples forming a guide surface (Fig. 1).

The chain is driven from a continuously rotating shaft (not shown) and by the intermediary of any known means such as a Maltese Cross (not shown), this uniform movement of the shaft is converted into an intermittent movement during which the chain is completely halted periodically for a short time and the letters moving along channel 49 will pause one by one just a moment in front of the sorting operator so that during this stopping period, the registering of the code number may take place by his depressing a plurality of keys on the keyboard 54. In any event, this registration must be terminated before the fingers 52 are again started. During the stopping period the sorting operator may read the destination of the next letter depending upon his alacrity.

IV. Transfer mechanism

In prolongation of the U-shaped channel 49 there is provided a mechanism arranged as a turnstile receiving

6

the letters one by one and passing them to a conveying device mounted below same.

In the shown embodiment, the transfer mechanism consists of two oppositely provided U-shaped channels 56 and 57 parallel with and affixed to a shaft 55 which may be rotated in the direction of the arrow. In Fig. 1 the channel 56 is just in line with the channel 49 so that a letter leaving the channel 49 may be pushed by a finger 52 into the channel 56. When the letter rests in the channel 56 or 57, it is supported by a slanting surface 58 located in the same plane as the surface 48.

The chain 51 is arranged in such a manner that close to the beginning of the channel 56, a finger 52 is stopped for a moment, thus ensuring that the letter completely reaches this channel 56.

The driving of the shaft 55 is linked to the movement of the chain 51. Here too a Maltese Cross (not shown) may be utilized for the drive of shaft 55 with the consequence that the shaft does not rotate in a uniform movement and is always stopped in positions displaced by 180° while during this stopping period a letter may be pushed into the channel 56 or 57 which is then in the operative or letter-receiving position. During the stopping period of the finger 52 which brought the letter into either channel 56 or 57, the shaft 55 rotates and the letter may fall in the same position into a letterholder of a further conveying device which is provided below same.

The driving of the entire sorting position namely the pneumatic suction device, the chain 51 and the transfer mechanism is effected from a common power source which also powers the chains of the supplying device by means of a special clutch and shock absorber, the function of which is to coordinate the movement of the three first mentioned parts of a sorting position in such a way that clutching in is only possible during a predetermined phase of movement of the conveying device mounted below same, since the latter must always be able to receive the letters from the transfer mechanism.

Since this clutch however may be arranged in various manners, it is sufficient to only mention its presence.

It is obvious that the driving speed of the various parts of the sorting position is chosen so that it is higher than the speed with which the sorter is able to operate his keyboard.

Furthermore it is obvious that in the above given description, special attention has been given to a letter sorting machine but that the invention is in no way limited thereto, so that other fields may be conceivable in which this sorting position might be used with equal success.

I claim:

1. In a machine for feeding flat objects one at a time having a first conveyor device for conveying the flat objects standing edgewise in a stack, a second conveying device at right angles to said first conveyor device, and a suction device for picking up said objects one at a time from said first conveyor device and transferring them to said second conveyor device, a transfer mechanism comprising a pivotal support for said suction device, a first means for pivoting said suction device from an initial position into contact with the stack of objects to pick up one of said objects, a second control means operative conjointly with said first means for thereafter translating said pivotal support upwardly in a direction parallel to the plane of said stacked objects and to return said device to its initial position, and means co-operating with said device and said second conveyor device for removing said object from said suction device and depositing it on said second conveyor device.

2. A machine according to claim 1, wherein said last named means comprises a flat plate mounted in front of said suction device in its initial position at an inclined angle to said second conveyor device, said plate having an aperture through which said suction device passes in its initial position, whereby said objects are deposited on

said conveyor device in an edgewise position upon return of said suction device to its initial position.

References Cited in the file of this patent

UNITED STATES PATENTS

769,927	Zeh	Sept. 13, 1904
907,944	Abrams	Dec. 29, 1908
1,399,483	Hornbeck	Dec. 6, 1921

1,442,126	Cadden	Jan. 16, 1923
1,452,867	Briggs	Apr. 24, 1923
1,897,093	Werner	Feb. 14, 1933
1,969,946	Root	Aug. 14, 1934
2,159,456	Spieß	May 23, 1939
2,231,339	Krueger	Feb. 11, 1941
2,532,626	Kleineberg	Dec. 5, 1950