ENVELOPE FEEDING MECHANISM

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2 Claims. (Cl. 271—62)

This invention relates to envelope feeding mechanism for advancing envelopes on edge in stack formation to a transfer point, and is in the nature of an improvement upon the invention disclosed and claimed in my copending application for Letters Patent of the United States Serial No. 80,942, filed March 11, 1949, which has matured into Patent No. 2,572,509 dated October 23, 1951, for Envelope Feeding Mechanism. The complete disclosure of that application is made a part of the present specification by reference.

In said application disclosure is made of a machine in which finished envelopes are supported on edge and advanced in a substantially horizontal direction to a transfer point at which upwardly traveling fingers are inserted between the sealing flap and the body of the leading envelope to withdraw it from the stack in an upward direction. In a machine of this kind it is important that there always be an envelope on hand to be carried away by the fingers because the fingers carry the envelopes through operating instrumentalities which would be fouled by the failure to deliver an envelope. At the same time, however, it is important that the envelopes of the stack arrive at the transfer point in a loose formation, so that a withdrawn envelope will not tend to carry along or to disarrange a following envelope.

In the illustrative machine of said application, therefore, provision is made of mechanism for driving a stack conveyor at two different speeds, one faster and one slower than the average speed at which the stack ought to reach the transfer point in order to maintain the envelope stack of the desired density at the transfer point. For controlling the two-speed driving mechanism a density meter is provided which includes means for projecting light diagonally downward across an edge of the stack near the transfer point and a photoelectric cell responsive to such light and effective to determine at which of the two speeds the conveyor will be driven at any given instant. In the broadest aspect of the invention the lower speed referred to may even be a zero speed; i.e., a state of rest.

In accordance with the present invention the general machine organization may be substantially the same as that of the illustrative machine of said pending application, but improvements have been effected in the density meter.

It is a feature of the present invention that the density meter has interposed between the light source and the photoelectric cell a reflecting chimney for receiving light transmitted through the stack and reflecting it back and forth until it passes ‘into the photoelectric cell. The chimney points downward and enables the photoelectric cell to be located below the conveyor mechanism and within the lateral bounds of the machine. The chimney is desirably formed with slightly divergent reflecting surfaces so that the light which enters the small upper end can spread out over the entire available surface of the photoelectric cell.

It is a further feature of the invention that a light shield is provided which is adapted to be interposed more or less between the chimney and the photoelectric cell, for blocking out from the cell any desired proportion of the light transmitted through the stack and the chimney. The shield desirably includes a pair of plates having confronting toothed edges, and means supporting the plates for relative movement toward and from interdigital relation. By adjustment of the shield the desired looseness of the stack may be maintained for various envelope thicknesses.

It is a further feature of the invention that the density meter is formed as a unitary structure, that provision is made for releasing it as a whole horizontally and vertically, and that the light source is arranged for vertical adjustment relative to the other parts of the meter.

It is a further feature of the invention that the photoelectric cell is made to include a projected elongated transparent tube and that the meter includes a socket for the tube, a protective, tubular, enclosing casing for the tube connected at one end to the socket and through its side to the chimney, and a closure plug for the free end of the tubular casing, together with means for removable holding the closure plug in place.

It is a further feature of the invention that the meter is formed to provide a complete unitary dust-proof and moisture-proof casing for protecting the reflecting surfaces of the chimney and the transparent tube of the photoelectric cell.

It is a further feature of the invention that the chimney is formed in two complementary sections which meet in a common plane, the meeting plane coinciding with one of the reflecting surfaces.

Other objects and advantages will hereinafter appear.

In the drawing forming part of this specification.
advantageous illustrative machine embodying the invention;

Fig. 2 is a sectional view, on a larger scale, taken upon the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a fragmentary sectional view taken upon the line 3—3 of Fig. 2 looking in the direction of the arrows;

Fig. 4 is a fragmentary plan view showing the density meter and immediately associated parts of the machine; and

Fig. 5 is a view in sectional elevation of the density meter parts as viewed in Fig. 2, but showing the parts spread out from one another.

The illustrative mechanism comprises conveyor chains 10 and 11 (Fig. 2) which run upon sprockets 4 (Fig. 1) for carrying individual envelopes upward and through suitable printing mechanism (not shown). The chains are driven at uniform speed by suitable drive mechanism. The chains 10 and 11 are equipped with inwardly reaching fingers 20 and 21.

The fingers 20 and 21 are designed to engage at the corners of the leading envelope of a stack 22 between the back and the folded sealing flap of the envelope, and to pick the envelope away from the stack and carry it upward.

The envelope stack 22 is supported upon a two-speed conveyor 31 which carries the envelopes in stack formation toward the transfer point at which they are picked up by the pin conveyor. Sucker shoes 32 are provided in the path of the envelopes at the transfer point to free the leading envelope from the stack and keep the envelopes from becoming accidentally disarranged.

The conveyor 31 comprises a pair of chains 33 and 34 which are guided in channel bars 35a and 35b and run upon sprockets 36 and 37, and upon a corresponding pair of sprockets 38, only one being shown, carried by shaft 39. The sprockets upon which the chains run are all alike, and they are all mounted in the same way, the construction being illustrated best in connection with the sprocket 36. The sprocket 36 has a hub 36a which is formed with a circumferential groove 36b. The hub 36a is connected to the shaft 37 through a key 36c which is slidable axially of the shaft. A screw 36d extends through the hub and is threaded part way through the key 36c, but terminates short of engagement with the shaft 37, so that the sprocket and key are free to slide together axially of the shaft 37. The channel bar 34a has attached to it by means of screw 34c a plate 34d which is formed at one end with an open-ended slot 34e in which the grooved portion 35b of the hub 35a is received. The channel bar 34c is adjustable laterally of the machine. When the channel bar 34c is so adjusted it carries with it the chain 34 and also the sprocket 35. The construction at the opposite end of the conveyor 31 is the same as that which has been described for the sprocket 34, and hence the channel bar 34a also adjusts one of the sprockets 38 at that end of the conveyor. The sprockets 36 and 38 at the opposite side of the machine are similarly controlled by the channel bar 34c.

The envelopes travel between guide plates 37a upon which upper and lower guide ribs 37b are provided.

The shaft 37 is the drive shaft for the conveyor 31. The drive mechanism for shaft 37 is not illustrated, but it may desirably be in all respects the same as the drive mechanism for the corresponding shaft illustrated in Ser. No. 80,842. Briefly, two drives are provided from a common driving member to the shaft 37. One of these is a slow speed drive which runs constantly at one position and which drives the shaft 37 at the speed determined by it when the high speed drive is not effective. When conditions require a speeding up of the conveyor 31, an electromagnetically operated clutch is made effective to render the high speed drive active. An over-running friction clutch between the low speed drive and the shaft 37 enables the shaft 37 at such times to run at a higher speed than that dictated by the low speed drive. In other words, the low speed drive is normally effective, but is superseded when the high speed driving clutch is thrown to effective position. As soon as the high speed driving clutch is withdrawn from the effective position, the low speed drive again becomes automatically effective. The density meter comprises a reflecting chimney 46 which includes two complementary parts 41 and 42. The part 42, in addition to its other functions, constitutes the carrier for the meter 43 as a whole. The chimney part 42 includes an extended bracket portion 43a. The portion 43a is formed with a guide channel 44 which embraces a vertical rib 45 of a support 46. A screw 47 is passed through a vertical slot 48 of the bracket portion 43a for securing the chimney upon the support 46 with capacity for vertical adjustment. The support 45 is formed with a horizontally extending channel which fits upon a horizontally extending guide bar 49. The guide bar 49 is affixed to the channel bar 34a by screws 50. A screw 51 is passed through a horizontal slot 52 of the support 46 and is passed through the bar 48 and threaded into the channel bar 34a for securing the support 46 upon the channel bar with capacity for longitudinal, horizontal adjustment. Since the supporting bracket 43a of the meter 43 is normally mounted in a fixed position upon the support 45, adjustment of the support 46 carries with it the entire meter. The meter is also adjusted laterally by and with channel bar 34a.

The chimney member 42 includes an external projection 53 upon which a light carrying bracket 54 is adjustably mounted. A screw 55 is passed through a slot 56 of the bracket 54 and is threaded into the projection 53. The bracket 54 at its upper end is provided with a pair of sockets 58 in which light bulbs 57 are threaded. The light bulbs 57 constitute the source of light for the density meter. They are positioned above the lower edge of the stack and close to the side of the stack so that light from them can pass diagonally downward through the lower right-hand corner of the stack as seen in Fig. 2 and into the chimney 40. The chimney members 41 and 42 are formed of metal and have opposed polished plane surfaces 58 and 59 which extend downward in slightly divergent relation and desirably so as to form equal angles with the vertical axis of the chimney. The members 41 and 42 are of common plane and are secured to one another by screws 60. The chimney is closed at its upper end by a beveled transparent disk 61 of glass or other suitable material, and the disk is surrounded and held in place by a retaining ring 62, the ring being secured to the chimney member 42 by screws 63.

The chimney members 41 and 42 are formed at their lower ends with horizontally extending
flanges 64 and 65 whose lower faces are disposed in coplanar relation.

A fitting 66 is secured to the flange 65 by a pair of screws 67. The upper face of the fitting 66 is generally flat and lies in contact with the lower faces of the flanges 64 and 65. The fitting 66 includes a cylindrical casing member 68 in which a pronged, transparent tube 69 carrying the photoelectric cell mechanism is received and protected. At the rear end of the fitting 66 includes a web portion 70 which is connected by screws 71 and 72 to the flange 65 to form a housing for the electrical mechanism controlled by the photoelectric cell. The web portion 70 carries a socket 75 in which the prongs of the photoelectric cell tube are inserted. Spring fingers 76 secured to the sides of the tubular housing 68 by screws 77 extend beyond the end of the housing 68 and rest resiliently to hold a closure plug 78 removable in place.

The upper wall of the fitting 66 is formed with an opening 79 in register with the chimney opening, through which light from the chimney may enter the housing 68 to impinge upon the cathode of the photoelectric cell.

Provision is made of a light shield for blocking out from the photoelectric cell any desired proportion of the light transmitted by the chimney. The horizontal web portion 80 of the fitting 66 is formed with a channel 81 in which a shield plate 82 is slidably mounted. The shield plate is formed with teeth 83 (Fig. 4) along its inner margin which may be projected across or part way across the opening 79.

A screw 84 is passed through a washer 85 and through an annular slot 86 of the shield plate 82, and is threaded into the horizontal web 80 for clamping the shield plate 82 in different desired positions of adjustment. The outer end of the shield plate 82 is upturned to provide a convenient finger grip flange 87.

A similar shield plate 82a is similarly mounted in a groove 81a of horizontal web portion 80a with capacity for longitudinal adjustment. Since the construction, operation and mounting of the shield plate 82a is the same as that of the shield 82, no detailed description will be given but the corresponding parts have been designated by the same reference characters with the subscript "a" added in each reference. The fingers 83 and 83a of the shield plates 82 and 82a are arranged in staggered relation, the teeth of one plate being opposite the notches of the other.

With this arrangement, the plates can be adjusted toward and into interdigital relation and can be brought as nearly into contact with one another as desired. In the opposite direction the adjustment may be carried so far that the points of the teeth lie clear of the opening 79.

The importance of the light shield lies in the fact that a desired stack density can be obtained with envelopes of any weight or thickness.

Let it be assumed that a roll of envelopes of a given weight and thickness has been successfully dealt with and that it is now desired to deal with envelopes which are twice as thick. The fact that the envelopes of the new lot are thicker does not mean that they should be more widely spaced apart than the envelopes of the previous lot. If the spacing is to be maintained the same as before, however, considerably less light will pass through the stack than before and it will, therefore, be necessary to separate the shield plates 82 and 82a so as to permit a considerably greater proportion of the light which does pass through the stack to reach the photoelectric cell. In other words, since the photoelectric cell is arranged to trip the high speed clutch at a given light intensity, that light intensity should be made available to the cell substantially when the desired spacing occurs, whether the envelopes dealt with be thick or thin.

The chimney forms a convenient means for conducting the light from the lower edge of the stack down to a photoelectric cell which is located within the lateral portion of the machine but below the conveyor mechanism.

The fact that the chimney walls are made divergent enables the light which enters at the small upper end to be spread over the entire available area of the photoelectric cell at the lower end. It also tends to change the light rays as they are reflected back and forth, progressively toward parallelism, a condition which is desirable for causing the light shield to act in the most satisfactory manner.

The fact that the meeting plane of the chimney members 41 and 42 coincides with the horizontal web 80 is advantageous because of the ease with which an accurate fit can be secured and because the necessity for channeling or grooving the member 42 is obviated. It will be noted that the chimney, together with the fitting 58 and the housing 73, 74 forms a complete dust-proof and moisture-proof enclosure for the reflecting surfaces of the chimney and for the photoelectric tube 63. Access to the tube 85 may be conveniently had, however, by removing the plug 78. The density meter can be removed in its entirety simply by withdrawal of the screw 41, whereupon the chimney member 41 can be detached simply by backing out the screws 60. Such detachment affords access to the polished surfaces of the members 41 and 42.

I have described what I believe to be the best embodiments of my invention. I do not wish, however, to be confined to the embodiments shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. In an envelope feeder for advancing envelopes on edge in stack formation to a transfer point which includes mechanism for advancing the stack at varying speeds in order to secure the desired stack density near the transfer point; a density meter for controlling said mechanism comprising, in combination, a light source arranged to transmit light diagonally downward across a corner of the stack, a photoelectric cell for receiving said light and controlling said mechanism comprising, in combination, a light source arranged to transmit light diagonally downward across a corner of the stack, a photoelectric cell for receiving said light and controlling said mech-
anism in accordance with the intensity of the light received, a reflecting chimney for receiving light transmitted through the stack and reflecting it back and forth until it passes clear of the chimney and into the photoelectric cell, and a light shield adapted to be interposed more or less between the chimney and the photoelectric cell, the shield including a pair of plates having confronting toothed edges, means supporting the plates for relative movement toward and from interfitting relation, and means for securing the plates in fixed positions.

ABRAHAM NOVICK.

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The following references are of record in the file of this patent:

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