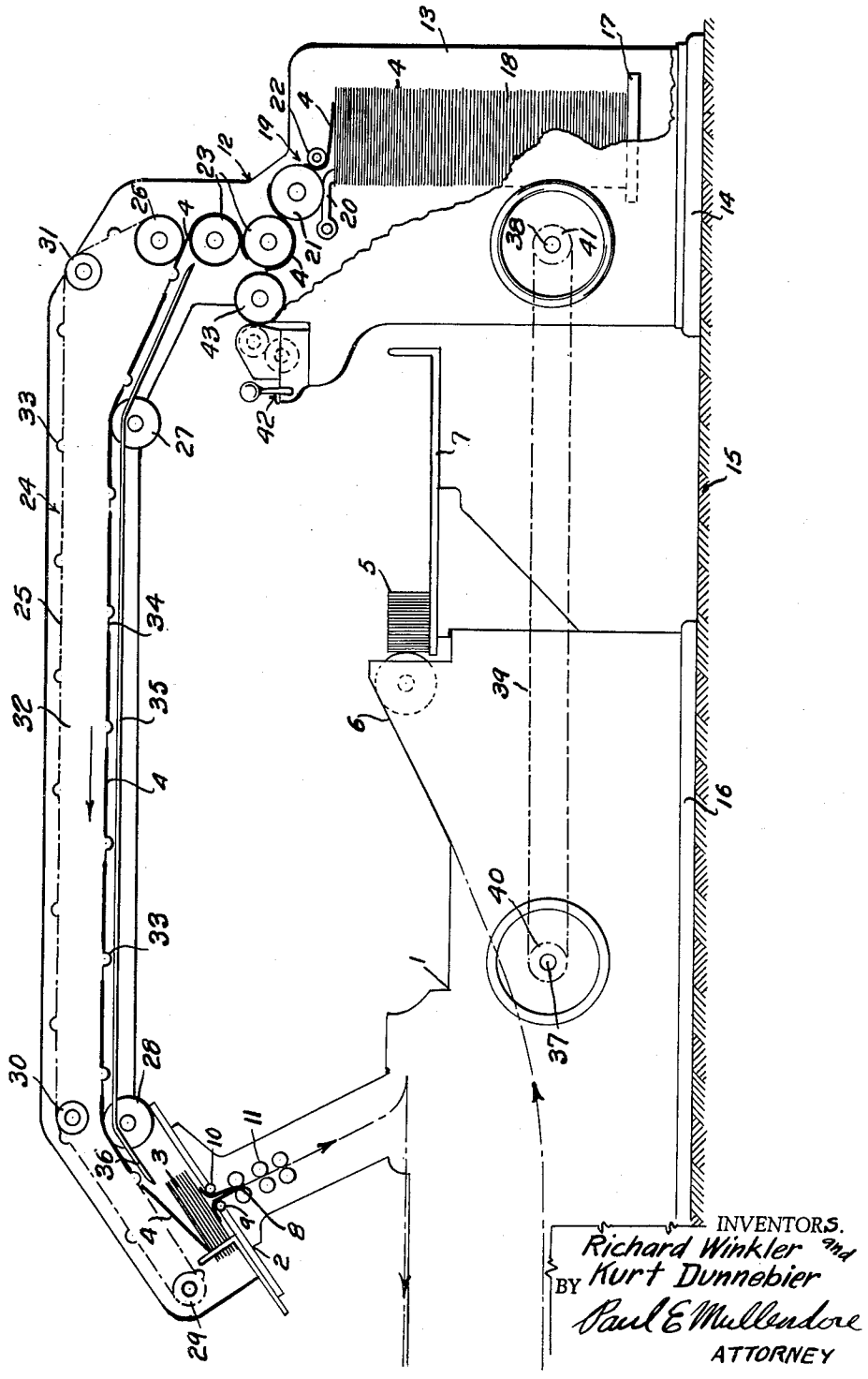
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APPARATUS FOR SUPPLYING BLANKS TO ROTARY ENVELOPE MAKING MACHINES

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APPARATUS FOR SUPPLYING BLANKS TO ROTARY ENVELOPE MAKING MACHINES

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This invention relates to an apparatus for supplying blanks to rotary envelope and similar machines.

In machines of this character, the blanks are usually fed into the machine from the bottom of a stack of blanks. It is well known that successful feed of the blanks is dependent upon the allowable weight of the stack of blanks on the lowermost blank, consequently it is the practice for the operator of the machine to place only a small supply of blanks in the stack at one time, to keep the weight thereof within tolerable limits. The result thereof is that the working stack of envelopes is rapidly depleted. Therefore, the operator must constantly watch the stack and frequently replenish the stack to assure an adequate working supply without overloading the bottom blank of the stack. Since the operator also takes care of the finished envelopes as they are discharged from the delivery end of the machine, the operator must make frequent trips back and forth between the respective ends of the machine in order to keep the machine in operation. It is thus obvious that the capacity of the machine is dependent upon the ability of the operator to keep the supply of blanks available in the stack without overloading the lowermost blank.

Rotary envelope making machines are capable of operating at higher speeds to give greater production, but the supply of blanks by the operator cannot be kept in pace with the increased speed of the machine.

Another difficulty is that the weight of the stack on the lowermost blank interferes with the proper withdrawal of the blanks into the machine. This is particularly true in those machines wherein the blanks are folded upon themselves incidental to their withdrawal from the stack, as when providing one of the folds in a finished envelope. This is because variation in weight results in variation and placement of the fold, with the result that the envelopes are not uniform, and many of them may be too defective for use. This difficulty is especially aggravated when the blanks are in larger size and composed of relatively heavy or stiff material.

It is, therefore, a principal object of the present invention to provide an auxiliary apparatus for a rotary envelope making machine to mechanically and automatically keep a reserve supply of blanks in the working stack, at a certain desired level, by mechanically feeding the blanks from a supply stack to the working stack in correlation with the withdrawal of the blanks into the machine.

A further object of the invention is to provide a blank feeding attachment for rotary envelope making machines by which one or more operations can be performed on the blanks by mechanisms that are incorporated in the attachment, when such mechanisms are not provided in the envelope making machine.

Other objects of the invention are to provide an auxiliary feeding apparatus that may be initially supplied from a supply stack, and wherein the height of the supply stack is governed only by the size of the auxiliary apparatus; to provide an auxiliary feeding apparatus for removing the blanks from the top of the supply stack and conveying the blanks one at a time for deposit on the top of the working stack, in conformity with withdrawal of the blanks from the bottom of the work stack; and to

provide an auxiliary feeding apparatus wherein the height and weight of the supply stack are entirely independent of the feed of the blanks into the envelope making machine.

In accomplishing these and other objects of the invention, we have provided an improved structure, the preferred form of which is illustrated in the accompanying drawing, wherein the single FIGURE shows a rotary envelope making machine equipped with a blank supplying apparatus embodying the features of the present invention.

Referring more in detail to the drawing:

1 designates, somewhat diagrammatically, a rotary type of envelope making machine, which includes a support 2 for a stack 3 of envelope blanks 4, and from which the envelope blanks are drawn from the bottom of the stack and fed into the machine for folding and gumming thereof to provide finished envelopes. The finished envelopes 5 are discharged from the delivery end 6 of the machine onto a work table 7. The operator of the machine gathers the envelopes 5 and places them in boxes in accordance with the usual practice.

Without the present invention, the operator must keep a working reserve of blanks in the stack 3 without overloading the lowermost blanks with an excessive weight of the blanks thereabove, otherwise it is difficult to withdraw the blanks properly and accurately into the machine. It is the present practice to limit the weight by adding only a small number of blanks to the top of the stack. This requires the operator to leave his station at the work table 7 at frequent intervals in order to replenish the working stack on the support 2. It is thus obvious that the capacity of the machine is dependent upon the ability of the operator to keep the stack 3 supplied without overloading the blanks in the bottom of the stack.

As above stated, rotary envelope making machines of this character can be operated at higher speeds to greatly increase the output of finished envelopes, but it is physically impossible for the operator to maintain the supply of blanks and at the same time inspect and package the finished envelopes at the higher speeds. Heretofore any change in the customary procedure has resulted in increased cost of production because of the additional labor which would be required to operate the machine at the higher speeds.

In the machine illustrated, the lowermost blank is withdrawn in a manner to effect one fold 8 of the blank. This is effected by positioning of the stack 3 over indrawing rollers 9 and 10 that operate in contact with the lowermost blank in the stack and cause the blank to be drawn therebetween in making the fold 8. It is obvious that accuracy in positioning the fold 8 is dependent upon the ease with which the blank can be withdrawn from under the weight of the stack. Therefore, to assure proper positioning and formation of the fold between the indrawing rollers 9 and 10, the reserve supply of blanks may be further restricted to provide proper location of the initial folds 8 and advance thereof into the machine by means of forwarding rollers 11.

With the above in mind, it is advantageous to maintain a limited reserve of blanks 4 on the support 2 and to feed blanks 4 onto the top of the stack 3 at a rate substantially corresponding to the rate of withdrawal of the blanks from the bottom of the stack, as now to be described.

In carrying out the present invention, we provide an auxiliary apparatus 12 for supplying the blanks. The apparatus 12 embodies the features of the present invention and includes a frame 13 having a base 14 which may be supported on a floor 15 at the level of the base 16 of the envelope making machine 1. The frame 13

is preferably located at the delivery end of the machine, as shown in the drawing. The frame 13 carries an elevator 17 that is adapted to be raised and lowered in accordance with feed of blanks, as later described, to supply the working stack 3. The supply of blanks is carried in a stack 18 on the elevator 17, with the uppermost blank in position to be engaged by a withdrawal mechanism 19. The elevator 17 is adapted to be raised automatically to keep the top of the stack in continuous contact with the withdrawal mechanism 19, as the blanks are removed.

In the illustrated instance, the withdrawal mechanism 19 includes a suction nozzle 20 that moves in one direction into contact with the uppermost blank to engage a marginal edge thereof and moves in the opposite direction to lift the marginal portion into position to be engaged between rollers 21 and 22. The roller 21 is preferably a suction roller so as to grip the blank and effect feed thereof into contact with the first of a series of suction rollers 23 by which the blank is carried to an offtake conveyor 24 by which the blanks are transferred for deposit on the top of the working stack 3.

The conveyor 24 may be of any suitable type, such as endless belts 25 running over rollers 26, 27, 28, 29, 30 and 31, that are suitably journaled between side members 32 that extend from the upper portion of the frame 13 over the top of the envelope machine 1, and which terminate above the support 2, as shown in the drawing. The endless belts are preferably provided along the length thereof with clips, diagrammatically illustrated at 33, such as commonly used in securing sheet material to endless conveyors forming the parts of various sheet conveying equipment, and which clips are well known to those skilled in the art. The rollers of the conveyor are located so as to provide a run 34 which cooperates with suitable guides 35 to carry the blanks to a position over the stack 3, where the blanks are released from the ends 36 of the guides 35.

It is to be understood that the rollers and other operating mechanisms of the auxiliary apparatus 12 are operated in timed relation with the operating mechanisms of the envelope making machine 1. This is accomplished by connecting an operating shaft 37 of the apparatus 12 with a drive shaft 38 of the envelope making machine by means of a driving connection, such as a chain 39, which operates over sprockets 40 and 41 on the respective shafts 37 and 38.

The apparatus 12 may be incorporated into the construction of an envelope making machine, or it may be furnished as an attachment to an existing envelope making machine of the type described, and be connected in driving relation therewith by means of the chain 39. If the apparatus is provided as an attachment to an existing machine, it may be desirable to provide the attachment with one or more auxiliary devices 42 to perform various operations on the blanks 4 that are not supplied by the envelope making machine 1, for example, one or more printing, cutting, embossing, perforation, gumming or scoring operations. The device or devices 42 to perform these operations may be carried by the frame 13 in position to engage the blanks as they are advanced by the series of suction rollers 23. For example, the drawing shows a printing mechanism having a printing cylinder 43 that is arranged to contact the blanks as they are carried on the periphery of one of the suction rollers 23.

In the case of the manufacture of envelopes which are formed of heavy or stiff material, the folding point 8 may be facilitated by providing a scoring device for effecting a transverse score of the blanks during their movement from the supply stack 18 to the working stack 3, which scoring device may, for example, be substituted for the printing mechanism or used in conjunction therewith.

Assuming that the apparatus 12 of the present invention is installed in connection with an envelope making machine 1, as shown in the drawing, and that the drive shaft 38 thereof is connected with the operating shaft 37 of the envelope making machine. When thus connected, the various mechanisms and rollers of the attachment are operated in synchronism with the various mechanisms of the envelope making machine, so that the blanks will be removed from the top of the supply stack 18 and added to the top of the working stack 3 in accordance with withdrawal of blanks from the bottom of the working stack, to thereby maintain a constant uniform height of the working stack and a constant uniform pressure on the lowermost blanks as they are drawn into the envelope making machine.

In starting the mechanism, a working supply of blanks is placed in position in the support 2, and a substantially large stack 18 is placed upon the elevator 17 in its lowermost position. After placement of the supply stack on the elevator 17, the elevator is raised so that the top of the stack is in position to be engaged by the suction nozzle 20. When the suction nozzle 20 engages the uppermost blank of the supply stack 18, the marginal edge thereof is carried upwardly into position to be engaged between the roller 22 and the suction roller 21, where the suction roller continues engagement of the blank to carry the blank away from the roller 22 and to transfer the blank to the first of the suction rollers 23. During carriage of the blanks by the suction rollers 23, one or more operations may be performed thereon, as may be desired. When the blank reaches the conveyor belts 25, the clips 33 thereon will engage the blank to effect attachment thereof and carriage of the blank along the guide rails in the direction of the working stack 3. After a blank has been withdrawn from the roller 22, the suction nozzle 20 again swings into contact with a following blank, to start its removal from the supply stack. The blanks are thus successively removed from the stack and continuously advanced to the discharge end of the guides 35, where the clips release and drop the blanks onto the top of the working stack 3, as shown by the heavy lines of the drawing.

It is obvious that since the blanks are removed from the bottom of the working stack in accordance with the deposit of blanks on the top of the working stack, the height of the working stack is maintained substantially constant, with the weight of the stack on the lowermost blank constantly uniform, to assure proper feed of the blanks into the envelope making machine. After placement of the supply stack on the elevator platform 17, the operator need not leave his station at the delivery end of the machine until it again becomes necessary to replenish the supply of blanks in the supply stack. The operator may stop the envelope making machine while the supply stack is being renewed. If desired, it is practical that the supply stacks of a plurality of envelope making machines may be maintained by a separate operator when each of the machines is equipped with an apparatus 12.

From the foregoing, it is obvious that we have provided an apparatus for supplying blanks to the working stack of blanks in an envelope making machine, so that the envelope making machine can be operated at higher speeds to increase the output thereof.

What we claim and desire to secure by Letters Patent is:

1. In combination with an envelope making machine having a discharge table for receiving finished envelopes thereon for removal by an attendant of the machine and said envelope making machine having means remote from said discharge table for feeding blanks into the machine from the bottom of a substantially shallow working stack, a blank supply mechanism adjacent said discharge table and remote from the working stack including means for supporting a supply stack of blanks adapted to be filled by the operator in quantity capable of maintaining the

machine in operation over a substantial period of time, means for removing the blanks individually from the top of said supply stack one at a time and in spaced relation, a conveyor connected with said removing means for carrying the blanks separately in spaced relation from the removing means and having a discharge end extending over the working stack for depositing the blanks individually onto the working stack, and a driving mechanism between the envelope making machine and the envelope blank supply mechanism for operating the blank supply mechanism in accordance with the rate of movement of the blanks from the bottom of the working stack into the envelope making machine.

2. In combination with an envelope making machine having a discharge table for receiving finished envelopes thereon for removal by an attendant of the machine and said envelope making machine having means remote from said discharge table for feeding blanks into the machine from the bottom of a substantially shallow working stack, a blank supply mechanism adjacent said discharge table and remote from the working stack including means for supporting a supply stack of blanks adapted to be filled by the operator in quantity capable of maintaining the machine in operation over a substantial period of time, means for removing the blanks individually from the top of said supply stack one at a time and in spaced relation, a conveyor connected with said removing means for carrying the blanks separately in spaced relation from the removing means and having a discharge end extending over the working stack for depositing the blanks individually onto the working stack, means between the conveyor and said removing means for performing an operation on the blanks while they are being carried to the conveyor, and a driving mechanism between the envelope making machine and the envelope blank supply mechanism for operating the blank supply mechanism in accordance with the rate of movement of the blanks from the bottom of the working stack into the envelope making machine.

3. In an envelope making machine, the combination of means for feeding blanks from the bottom of a substantially shallow working stack of blanks, means remote from said blank feeding means for supporting a supply stack of blanks in quantity capable of maintaining the machine in operation over a substantial period of time, means for removing the blanks individually from the top of the supply stack, conveyor means leading from said blank removing means of the supply stack for carrying the blanks separately in spaced relation and having a discharge extending over the working stack for depositing the blanks individually onto the working stack, and a driving mechanism between the envelope making machine and the blank removing means of said supply stack for operating the blank removing means in accordance with the feed of blanks from the working stack to cooperate with the conveyor means for maintaining a uniform height of the working stack.

4. In an envelope making machine, the combination of means for feeding blanks once folded from the bottom of a substantially shallow working stack of blanks, means remote from said blank feeding means for supporting a supply stack of blanks in quantity capable of maintaining the machine in operation over a substantial period of time, means for removing the blanks individually from the top of the supply stack, printing means connected with the blank removing means for printing the blanks in single thickness, conveyor means leading from said printing means for carrying the printed blanks separately in spaced relation and having a discharge extending over the working stack for depositing the blanks individually onto the working stack, and a driving mechanism between the envelope making machine and the blank removing means of said supply stack for operating the blank removing means in accordance with the feed of folded blanks from the working stack to cooperate with the conveyor means for maintaining a uniform height of the working stack.

5. In an envelope making machine, the combination of means for feeding blanks once folded from the bottom of a substantially shallow working stack of blanks, means remote from said blank feeding means for supporting a supply stack of blanks in quantity capable of maintaining the machine in operation over a substantial period of time, means for removing the blanks individually from the top of the supply stack, means connected with the blank removing means for performing an operation on the blanks when they are in single thickness, conveyor means connected with said last named means for carrying the blanks separately therefrom in spaced relation and having a discharge extending over the working stack for depositing the blanks individually onto the working stack, and a driving mechanism between the envelope making machine and the blank removing means of said supply stack for operating the blank removing means in accordance with the feed of folded blanks from the working stack to cooperate with the conveyor means for maintaining a uniform height of the working stack.

6. In an envelope making machine having a discharge table for receiving finished envelopes thereon for removal by an attendant of the machine, the combination of means for feeding blanks once folded from the bottom of a substantially shallow working stack of blanks, means adjacent the discharge table for supporting a supply stack of envelope blanks in quantity capable of supplying the machine over a substantial period of time and adapted to be maintained by the operator at said discharge table, means for removing the blanks individually from the top of the supply stack, printing means connected with the blank removing means for printing the blanks in single thickness, conveyor means connected with said printing means for carrying the printed blanks separately in spaced relation and having a discharge extending over the working stack for depositing the blanks individually onto the working stack, and a driving mechanism between the envelope making machine and the blank removing means of said supply stack for operating the blank removing means in accordance with the feed of folded blanks from the working stack to cooperate with the conveyor means for maintaining a uniform height of the working stack.

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