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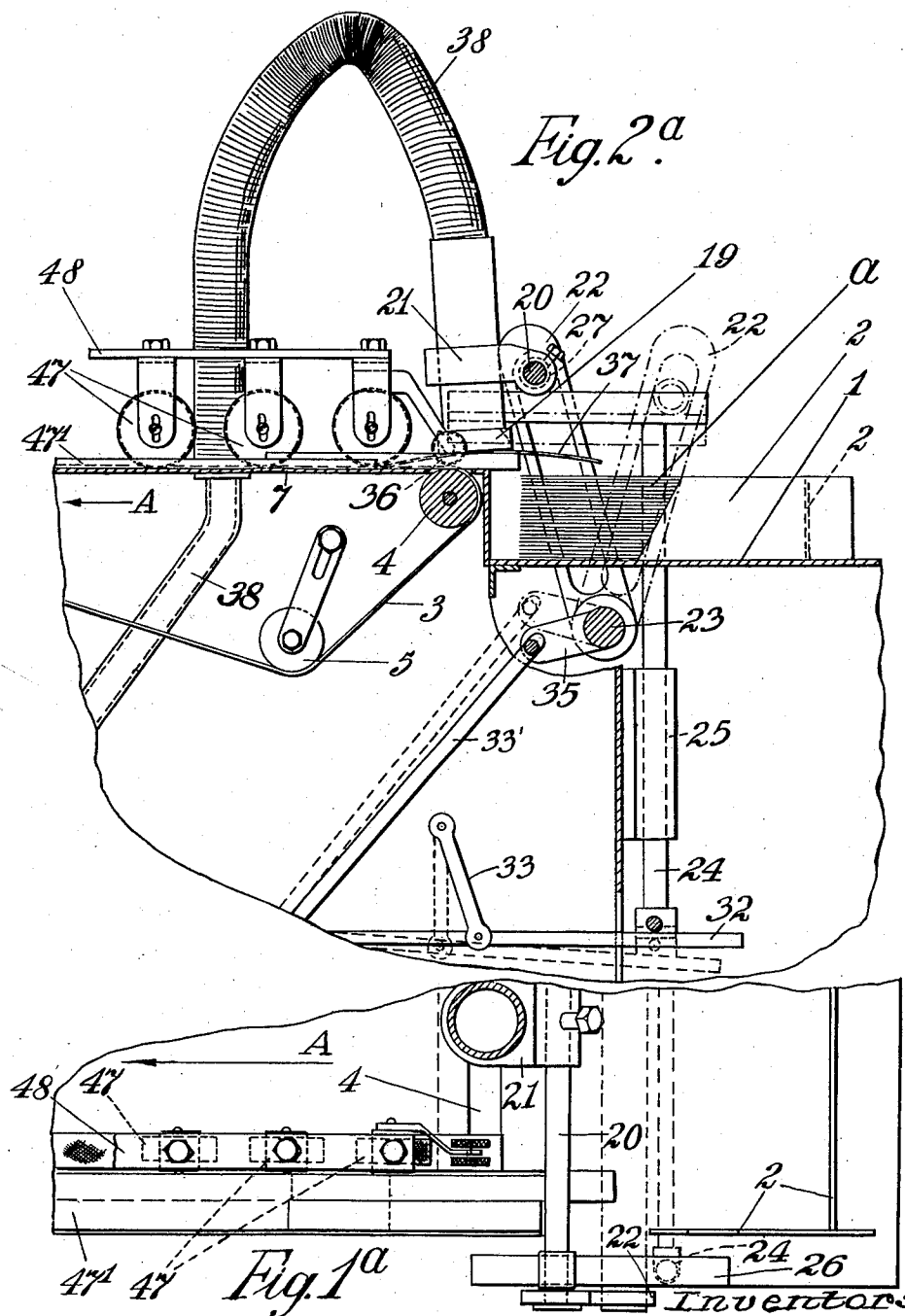
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2,569,219

APPARATUS FOR INSERTING DOCUMENTS INTO ENVELOPES

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3 Sheets-Sheet 2



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APPARATUS FOR INSERTING DOCUMENTS INTO ENVELOPES

3 Sheets-Sheet 3

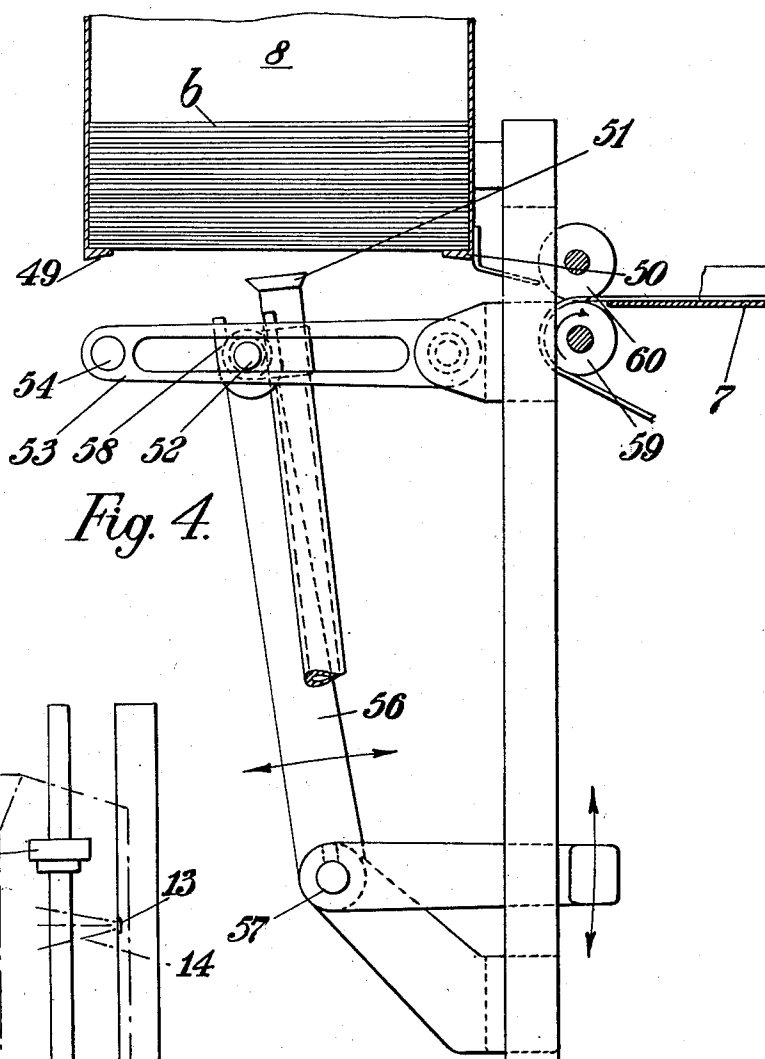


Fig. 4.

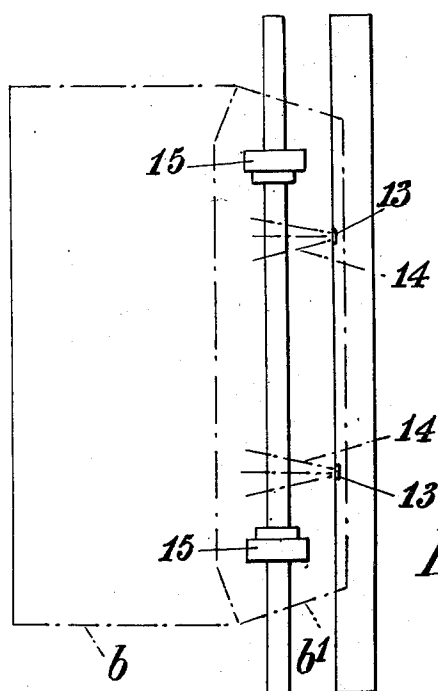


Fig. 3.

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APPARATUS FOR INSERTING DOCUMENTS
INTO ENVELOPES

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Section 1, Public Law 690, August 8, 1946
Patent expires February 20, 1965

2 Claims. (Cl. 93—6)

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This invention relates to an apparatus for inserting documents into envelopes and enclosing the same therein.

The main object of the invention is to provide an apparatus of this kind in which the insertion of the documents into the envelopes is effected in a more simple and efficient manner.

In the apparatus according to the invention the envelopes which are supplied from a stack and the documents to be inserted in the envelopes and which are delivered from a separate stack are transported in horizontal planes in directions at right angles to each other, the open end of the envelopes facing in a direction at right angles to that of their transportation and the direction of transportation of the documents being towards the said open ends of the envelopes, air being injected into the open end of the envelope in order to blow it open, this injection taking place at a point where the transported documents reach the line of transportation of the envelopes.

One form of combined document-folding, envelope-opening and document-inserting machine according to the invention will now be described with reference to the accompanying drawings, in which:

Figures 1 and 2 are respectively a plan view and a part sectional elevation showing the essential parts of the machine partly broken away, and Figure 2 also showing the holder for the envelopes,

Figures 1a and 2a are respectively a plan view and a part sectional elevation showing the mechanism for removing sheets of paper from the holder.

Figure 3 is a plan view of a part of the apparatus where the injection of the air into the envelope takes place.

Figure 4 shows in part sectional elevation the means for removing the envelopes from their holder.

Referring to the drawings, 1 is the table of the apparatus, 2 is the holder of the documents *a* to be fed to the envelopes and preferably consisting of a number of adjustable guiding plates, 3 is a conveyor feeding the documents in the direction of the arrow A, the conveyor belt running over rollers 4 and being kept in tension by an adjustable tension roller 5. *c'*, *c*², *c*³ and *c*⁴ are the folding rollers of a document folding mechanism which also comprises folding plates *d'*, *d*². The folding rollers and folding plates are of a well-known type and need not be described in detail, they are arranged to receive the documents one by one from the conveyor belt 3 and to deliver

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them in folded condition on to a table 6 fixed in the front of the rollers *c*³, *c*⁴ in position to receive the folded documents therefrom. The table 6 is supported immediately above a table 7 which extends across the front of the folding mechanism.

An envelope feeding mechanism is arranged to take the envelopes *b* one by one by suction from underneath a holder 8 where they are stacked in a pile. This mechanism is described and shown in detail in Patent Specification No. 2,524,417 and is not claimed per se in the present application. The envelopes are fed in the direction of the arrow B transverse to the direction from which the folded documents are delivered by the folding rollers *c*³, *c*⁴ so that each envelope arrives on the table 7 in the position indicated in Figure 1 by the broken line *b* with its open side facing towards the folding mechanism and with its flap *b'* underneath the table 6. A guide 9 is provided for locating the back edge of the envelope and a lay finger 10 is provided for checking the forward movement of the envelope when it arrives in the proper position for receiving a document from the folding mechanism. A suitable cam or the like (not shown) is arranged to lower the finger 10 out of the path of the envelope after a document has been inserted therein to allow the filled envelope to continue its movement over the table 7 from which it is fed to a suitable moistening, sealing and packing mechanism (not shown). If a self-sealed rubberised sealing flap is used no moistening mechanism is necessary. Suitable feeding mechanism, shown in the drawing by an endless feed band 11 is arranged to feed each envelope continuously in the direction of the arrow B except when the envelope is temporarily arrested by the action of the lay finger 10. The envelopes may be inserted in the holder 8 with their flaps open; however, they may be stacked therein with their flaps folded over and in that case flap opening means of any suitable known type is arranged to open the flap of each envelope so that the flap passes under the table 6.

Mounted over the table 6 between the document folding mechanism and the open side of the envelope in the position in which the latter is arrested by the finger 10, is a compressed air conduit 12 provided with a number of nozzles 13 which may consist of simple holes and which are arranged to direct jets of air 14 into the open side of the envelope *b* so that the latter is blown open as shown in Figure 2. Between the nozzles 13 and the open side of the envelope are a pair of feed rollers 15 mounted on a shaft 16 and ar-

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ranged to feed the folded document over the table 6 into the envelope held open by the action of the air jets 14. The feed rollers 15 are so spaced apart as to leave a clear space between the shaft 16 and the table 6 for the passage of the air jets from the nozzles 13 into the envelope b.

The compressed air is supplied to the conduit 12 by a tube 40 which is connected to the outlet of a centrifugal fan 39, belt-driven by an electric motor 28. The suction side of the fan 39 is connected by a flexible conduit 38 to a suction nozzle 19 which applies the suction to the pile of documents for separating the sheets from the pile and feeding them for insertion into the envelopes. It will thus be seen that by such an arrangement starting and stopping of the electric motor will synchronously start and stop the suction on the nozzle 19 and the delivery of compressed air for blowing jets of air into the envelopes.

Any suitable means may be provided for turning over the envelope flaps so as to close the envelopes as they pass over the table 7.

Compressed air is supplied continuously to the nozzles 13 and the folding rollers c^1 , c^2 , c^3 and c^4 , feed rollers 15 and feeding mechanism 11 are continuously driven by suitable known means (not shown). The operation of the lay finger 10 is so timed that each envelope is arrested in the position shown in Figure 1 and held momentarily in this position to allow a document to be inserted, whereupon it is carried forward by the action of the feed mechanism 11 so as to make room for the next envelope. The document feeding mechanism, to be hereinafter described, and the envelope feeding mechanism above referred to are synchronized so that each document arrives at the feed rollers 15 at a time when an envelope is momentarily held by the finger 10 in position to receive it.

Referring to the mechanism for removing the sheets of paper *a* from the holder 2 by means of the suction nozzle 19 as shown in Figures 1*a* and 2*a*, the same forms the subject matter of the concurrent application Serial No. 791,059 and is not claimed per se in the present application. The suction nozzle 19 is carried by a shaft 20 by means of a bracket 21. The shaft extends horizontally above the top of the pile of sheets *a* adjacent one side thereof and being arranged to slide at its ends in slots provided in a pair of rocking arms 22 fixed to a horizontal rock shaft 23 located underneath the pile of sheets *a*, the said rocker arms being so arranged that they project upwardly from the rock shaft 23 at opposite sides of the pile. Located adjacent the arms 22 are a pair of vertical reciprocating push rods 24 passing through guide sleeves 25 and attached to track bars 26 adapted to support the shaft 20 through the intermediary of antifriction rollers 27 mounted on the ends of the shaft 20.

The mechanism feeding the sheets is operated by means of an electric motor and through the intermediary of suitable mechanism described in the concurrent Patent Application No. 791,059 whereby the push rods 24 and the rock shaft 23 are actuated, the push rods being moved up and down by a lever 32 movably suspended from the frame by a link 33 and the shaft 23 being rocked by a link 35 actuated in turn by a lever 33', the levers 32 and 33' being part of the suitable mechanism which is operable from the electric motor (not shown).

The general arrangement is such that during

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each cycle of operation the push rods are first lowered sufficiently to allow the suction nozzle 19 to move downwards to the maximum extent which may be necessary to bring it into engagement with the top of the pile, being then raised so that they lift the nozzle to a fixed level for the delivery of a sheet. The arrangement is further such that there is a dwell at each end of the reciprocating movement of the push rods.

There is a fixed time relation between the two guiding mechanisms of push rods and rock shaft. The actuating mechanism of the rock shaft is such that during each cycle of operation the rocking arms 22 move in the following manner: At the end of the upward movement of the push rods 24 the rocker arms are inclined forwardly as shown in full lines in Figure 2*a* so as to deliver a sheet held by the suction nozzle in between the roller 4, and a feeding roller 36 or other means for carrying the sheet away. The arms return to a vertical position during the dwell at the upper end of the reciprocating movement of the push rods 24 and remain in this vertical position during the downward movement of the push rods. During the dwell at the lower end of the movement of the push rods the arms 22 rock rearwardly to the position shown in broken lines and then during the upward stroke of the push rods the arms return to the forwardly inclined position; this cycle of operations is regularly repeated. 37 is a spring which keeps down the sheet at the edge after lifting and until it is taken up by the rollers 4 and 36.

Figure 4 shows the removal of the envelopes *b* from their holders 8 and this figure is taken bodily from Patent No. 2,524,417 and no claim is made thereto per se herein. It should be noted that the present case and the said patent have a common assignee. As shown in this figure the envelopes are supported on two ledges 49, 50, while allowing free access to the under surface of the lowermost envelope to a pneumatic suction nozzle 51 adapted to be mechanically actuated in such a manner that it is first brought into contact with the lowermost envelope and caused to grip the same by suction, then moved rearwardly so as to disengage the forward edge of the envelope from the ledge 50, and then lowered away from the bottom of the holder so as to detach the lowermost envelope from the pile of envelopes and deliver it to the rollers 59, 60 to be carried away along the table 7 to the position shown in Figure 1. The means actuating the nozzle include a transverse shaft 52 to which the nozzle 51 is secured, two pivoted arms 53 (only one of which is shown in the drawing) arranged at right angles to and on either side of the shaft 52 and having longitudinal slots in which engage the ends of the transverse shaft, a cross bar 54 connecting the free ends of the pivoted arms, a rocking shaft 57 and two rocking levers 56 (only one of which is shown in the drawing) having a forked end 58 in engagement with the transverse shaft.

Provision may be made for adjusting the positions of guide 9 and air jets 14 to suit envelopes of different sizes. 17 indicates adjusting means provided on the folding plates d^1 , d^2 for controlling the length of the folds of the paper; they consist of stops displaceable along the plates and set in the position corresponding to the point in the length of the paper where the fold is to be made; 18 indicates a micro-switch which will break an electric contact to stop the driving

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mechanism if two documents instead of one are taken in between the feed rollers c^3 and c^4 , thereby preventing two documents from being inserted into one and the same envelope.

In the operation of the machine the envelopes pass one by one over the table 7 and each envelope is momentarily arrested by the finger 10 in the position shown with its open flap b' under the table 6. The envelope is blown open by the action of the air jets 14 (two such jets being preferably used) as soon as the front edge of the envelope comes against the finger 10. The action of the air jet is continuous but, owing to the rapid movement of the envelope over the table, it is not until the movement of the envelope is arrested by the finger 10 that the air opens the envelopes. The documents pass one by one through the folding mechanism by which they are folded and delivered to the table 6. Each folded document arrives at the table 6 immediately after an envelope has arrived in the position indicated and the feed rollers 15 continue the forward movement of the document and push it into the envelope held open by the action of the air jets. The lay finger 10 then retracts and allows the filled envelope to be moved forward and then closed after which the envelope is sealed by the action of pressure rollers and delivered to a packing device.

If the postal packets are to have an open portion so that they will qualify for the cheap postal rate, envelopes having one end flap ungummed may be used. The machine may then operate to close and seal the main or top flap just as it would for completely sealed packets. The filled envelopes delivered will be open at one end and will thus qualify for the cheap postal rate. The end flap is loose but is of sufficient length to be enclosed under the back of the envelope, thus enabling air to be injected into the said envelope without displacing the ungummed flap.

In the conveyance of the sheets of paper along the table towards the folding means the sheets are kept in the proper alignment in a known manner by means of guiding wheels 47 supported by a bracket 48 attached to the frame of the apparatus and by a slotted guide bar 47' fitted at right angles to the wheels 47.

We claim:

1. An apparatus for filling series of envelopes with documents comprising a holder of a stack of envelopes, a holder of a stack of documents, a first table along which the envelopes can be transported singly from their holder, and a second table along which the documents can be transported singly from their holder, the top of the first table being at a higher level than the top of the second table, a third table interme-

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diating the tops of the first two tables, means capable of conveying the envelopes along the said first table, means capable of transporting the documents along the said second table at right angles to the direction of transportation of the envelopes, means for injecting air into the envelopes disposed at a point between the two tables in order to blow the envelope open, means at this point for introducing the documents into the envelopes and the means for introducing the documents into the envelopes consisting of feeding rollers disposed above the third table and a shaft carrying the said feeding rollers, the means for injecting the air lying between the delivery end of the second table and the document feeding rollers, and the latter being spaced apart in order to allow the air to be blown into the envelopes from the said air injecting means between the said shaft and the third table.

2. An apparatus for filling series of envelopes with documents comprising a holder of a stack of envelopes, a holder of a stack of documents, a table along which the envelopes can be transported singly from their holder, a table along which the documents can be transported singly from their holder, means capable of conveying the envelopes along the said first table, means capable of transporting the documents along the said second table at right angles to the direction of transportation of the envelopes, means for injecting air into the envelopes disposed at a point between the two tables in order to blow the envelope open and means at this point for introducing the documents into the envelopes, the apparatus further comprising a suction nozzle arranged over the stack of documents for removing them one after the other and delivering them on to the table along which they are transported, a centrifugal fan, an electric motor driving the centrifugal fan, a pipe connection from the outlet of the centrifugal fan to the said air injecting means and a pipe connection between the suction side of the said centrifugal fan and the said suction nozzle.

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