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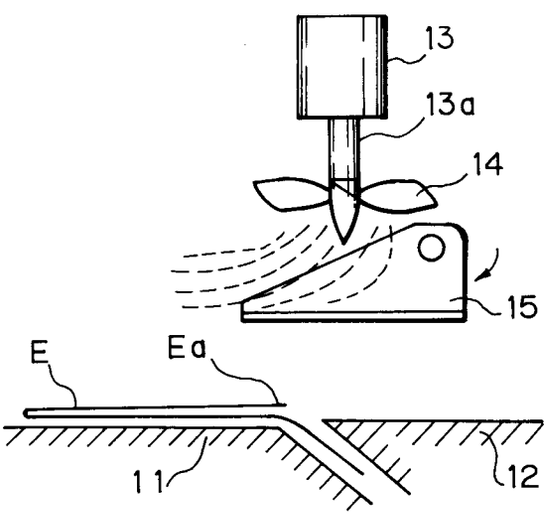
(54) Envelope opening device.

(57) An envelope opening apparatus for opening an opening portion (ϵa) of an envelope (E), by supplying air into the opening portion, with the envelope being delivered sequentially to a predetermined position. The apparatus comprises an air stream generating device for generating the air stream by rotating a motor driven fan (13,14), an air stream shifting plate (15) for directing the air stream to the opening portion of an envelope which is retained at a predetermined position and to a direction other than the opening portion, and a driving device for moving the air stream shifting plate between the two positions. The motor driven fan is continuously driven during the operation of the envelope delivering device.

Fig. 1



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This invention relates to an envelope opening device, and, more particularly, to an envelope mouth opener for ready access of enclosure such as a direct mail or the like to the envelope before the envelope is sealed by an automatic envelope sealing apparatus in which such the envelope opening device is to be used.

A system or a mechanism, as shown in Fig. 4, which handles a great number of envelopes for enclosing the enclosure in each of the envelopes and then sealing the envelopes has been well known as an automatic envelope sealing apparatus.

Referring to Fig. 4, there is shown an envelope stacker 1 is adapted to accommodate a plurality of envelopes E in a stack, each of which is empty of the enclosure. The envelopes E which are successively taken out of the stacker 1 are also successively fed downwardly by a conveyor mechanism composed of a plurality of rollers R1 - R6 and then clamped one by one by a gripper G moving on a predetermined annular path. The gripper G with the envelope E clamped thereby is moved from a first position Po and through positions P1, P2 and P3 where each of enclosures as a direct mail, a printed matter, papers and the like are enclosed therein.

As is apparent from Fig. 4, there is shown the manner in which the envelope E is successively subjected to various handlings in a position P1 where a flap E1 of the envelope E is opened, a position P2 where the enclosure L is inserted in the envelope E, and in a position P3 where the envelope E with the enclosure L therein is ready for conveyance to an envelope sealing mechanism (not shown) which is designed to apply moistening treatment to the flap E1, bend the flap, and seal the envelope.

An enclosure enclosing device of this class as aforementioned is required to open the mouth Ea of the envelope E to smoothly insert the enclosure L. To this end, a guide plate B has been customarily entered into the mouth Ea of the envelope to open the envelope E, as shown in Fig. 5. This approach, however, conventionally necessitates an envelope opener as shown in Fig. 6 so that the mouth Ea of the envelope is opened even before inserting the guide plate B to prevent the guide plate B from interfering with the mouth Ea.

This type of the envelope opening device is designed so that air supplied from an air supply source such as a compressor 1 or the like is held at a predetermined pressure and then fed by an electromagnet valve 3 to a nozzle 4 from which air is jetted toward the mouth Ea. For opening the mouth Ea, the electromagnet valve 3 is opened to have the nozzle 4 jetted and fed air to the interior of the envelope so that the mouth Ea is opened under air pressure. In this manner, the guide plate B is prevent from abutting against the mouth Ea and entered into the envelope E without any difficulty. On the other hand, when the enclosure L is inserted in the envelope, the electromagnet valve is closed to prevent air from being jetted. This will move the enclosure L smoothly without being subjected to the airflow.

As described above, in the prior art envelope opening device, a compressor 5 is utilized as a source of air supply, thus, it is required to provide an electromagnetic valve 3 for controlling the supply and interception of the air through the nozzle 4 and a regulator 2 for obtaining a suitable air pressure. Such a valve 3 and the regulator 2 are expensive and, thus, a prior art device utilizing such parts is expensive.

In another prior art device, a motor driven fan is disposed near to the position P2 and, by controlling the start and stop of the motor driving the fan the supply and intercept of the air is performed. The device enables a substantial reduction in cost by utilizing an electric motor and a fan which are inexpensive.

However, even though the power supply to the electric motor is stopped, the rotation of the rotation of the fan does not stop owing to the inertia force, thus, the start of the next step is delayed and the cycle time increases.

An object of the invention is to provide a novel envelope opening device which enables rapid shifting of the supply and stop of air into the opening of an envelope, and to thereby reduce costs.

According to the present invention, there is provided an envelope opening device for opening an opening portion of an envelope, by supplying air into the opening portion, with the envelope being delivered sequentially to a predetermined position, in which, the device comprises an air stream generating means for generating the air stream by rotating a motor driven fan, an air stream shifting plate for directing the air stream to an opening portion of an envelope which is retained at a predetermined position and in a direction other than that of the opening portion, and a driving means for actuating the air stream shifting plate, with the motor driven fan being continuously driven during the operation of envelope supplying means.

According to another aspect of the invention, the air stream generating means is disposed on the up-stream side of an enclosure inserting position and above a surface generally perpendicularly intersecting with the enclosure inserting direction, with the air stream shifting plate being disposed between the air stream generating means and a guide plate for holding an opening portion of the envelope in open condition, and the air stream shifting plate effects shifting movement when the envelope is arrived to the enclosure inserting posi-

tion and when the guide plate is inserted into the envelope.

Further objects and advantages of the invention will become apparent from the following descriptions in conjunction with attached drawings in which:

Fig. 1 is a schematic side view of an envelope opening device according to a preferred embodiment of the invention, and showing the initial condition;

Fig. 2 is a schematic side view of the device of Fig. 1 and showing a condition when an air stream shifting plate is rotated from the condition of Fig. 1;

Fig. 3 is a schematic side view of the device of Fig. 1 and showing a condition when the air stream shifting plate is further rotated;

Fig. 4 is a schematic side view of a prior art mail inserting and sealing device;

Fig. 5 is a schematic side view showing an enclosure inserting operation of the prior art device; and

Fig. 6 is a schematic side view showing a prior art envelope opening device.

A preferred embodiment of the present invention will now be explained referring Fig. 1 through Fig. 3.

Incidentally, description will be made referring to the envelope opening device applied on the prior art automatic mail inserting and sealing device explained as above.

In the drawings, shown at numeral 11 is an envelope support pedestal supporting the envelope E which is transported to the position P2 (Fig. 4) by the gripper G. Shown at numeral 12 is an enclosure support table provided to oppose the rear end of the envelope support pedestal 11 for supporting an enclosure L thereon. The enclosure L is moved forward by an enclosure inserting device not shown in the drawing and into the envelope E supported on the envelope support pedestal 11.

Shown at numeral 13 is an electric motor supported above the rear end portion of the enclosure support table 12 through a suitable mounting member not shown in the drawing, and at 14 is a fan mounted on a rotatable shaft 13a of the motor 13. The fan 14 is driven by the motor 13 to supply the airflow generally vertically downward and to the front end portion of the enclosure support table 12. The motor 13 and the fan 14 constitute air stream generating means.

Shown at numeral 15 is an air stream shifting plate provided between the fan 14 and the enclosure support table 12, and the shifting plate 15 is secured to a shaft 16 which is rotatably mounted on a support member not shown in the drawing. The shaft 16 is rotatable through a predetermined angle by means of a solenoid (not shown) which acts as driving means. The air stream shifting plate 15 is rotatable between a shut-off position shown in Fig. 1 and a supply position shown in Fig. 2 by the rotary movement of the shaft 16.

The operation of the device will now be explained.

When the electric source is connected to the automatic mail inserting and sealing machine, the motor 13 of the envelope opening device is also actuated and the fan 14 starts to supply air stream. The fan 14 continues the rotation during the actuation of the machine.

The air stream shifting plate 15 is normally maintained at the position shown in Fig. 1 with the solenoid not shown in the drawing is maintained inactuated condition, and the air stream supplied from the fan 14 is directed in generally horizontal direction.

When the envelope E is carried to the position P2 by the gripper G as shown in Fig. 4, the solenoid not shown in the drawing is actuated so that the shaft 16 rotates in the counter-clockwise direction in Fig. 1, and the air stream shifting plate 15 takes a position shown in Fig. 2.

The air stream of the fan 14 is guided to the opening portion Ea of the envelope E and the opening portion Ea is opened by the air pressure as shown in Fig. 2. Under this condition, the guide plate B is inserted into the opening portion Ea, thus, the operation is smooth.

When the guide plate B is inserted into the envelope E, the solenoid not shown in the drawing is actuated and the shaft 16 is rotated in the clockwise direction in Fig. 2 and, the air stream shifting plate 15 takes the position shown in Fig. 3 so that the supply of the air stream to the envelope E is intercepted.

According to the embodiment, the supply and intercept of the air stream to the envelope E can be performed instantly by the shifting operation of the air stream shifting plate 15, thus, it is possible to instantly start the inserting operation of the enclosure L into the envelope E when the guide plate B has been inserted into the envelope E. Therefore, as compared with the prior art device, in which it is required to suspend the inserting operation of the enclosure L into the envelope E until the rotation of the fan is terminated, it is possible to reduce substantially the cycle time of the mail inserting and sealing machine.

In the embodiment, the air stream shifting plate 15 moves between a position directly opposing the fan 14 and a position intersecting at an acute angle with the direction of the air stream, however, the location and arrangement of the fan 14 and the air stream shifting plate 15 can be determined as desired.

As described above, the envelope opening device according to the invention is constituted of a fan driven by an electric motor and an air stream shifting plate for shifting the direction of the air stream supplied by the fan, thus, it is possible to substantially reduce the cost as compared with the prior art device utilizing expensive air parts such as an electromagnetic valve and a regulator and the like. Further, the air stream shifting plate according to the present invention enables instant switch of the supply and interception of the air stream to the opening portion of the envelope, thus, as compared with the prior art device utilizing a fan, it is possible to substantially reduce the working time and to substantially increase working efficiency.

Claims

1. In an envelope opening device arranged so that air is admitted to each of envelopes which are successively supplied to predetermined positions, thereby opening a mouth of said envelope, said envelope opening device comprising:

   airflow generating means for generating an airflow;

   an airflow shifting plate for directing said airflow generated by said airflow generating means from and to said envelope mouth as held in position to and from portions other than said envelope mouth; and

   drive means for driving said shifting plate, said generating means continuously generating said airflow during the period of time when each of said envelopes is supplied to each of said predetermined positions.

2. An envelope opening device according to Claim 1, wherein said airflow generating means is disposed on the upstream side of a position P2 where said enclosure is inserted and in a position above a plane substantially perpendicular to the direction of movement of said enclosure, said airflow shifting plate is interposed between said airflow generating means and a guide plate B adapted to release and holding said envelope mouth Ea, said airflow shifting plate being adapted for shift movement in response to the moment when said envelope reaches a position A or said guide plate B enters into said envelope.

3. An envelope opening device according to claim 1, in which, the air stream shifting plate is mounted rotatably between an inclined position for directing the air stream from the fan toward the opening portion of the envelope and a generally horizontal position for directing the air stream from the fan in a generally horizontal direction and not directed toward the opening portion of the envelope.

4. An envelope opening device according to claim 3, in which, a solenoid is provided to effect the shifting movement of the air stream shifting plate.

Fig. 1

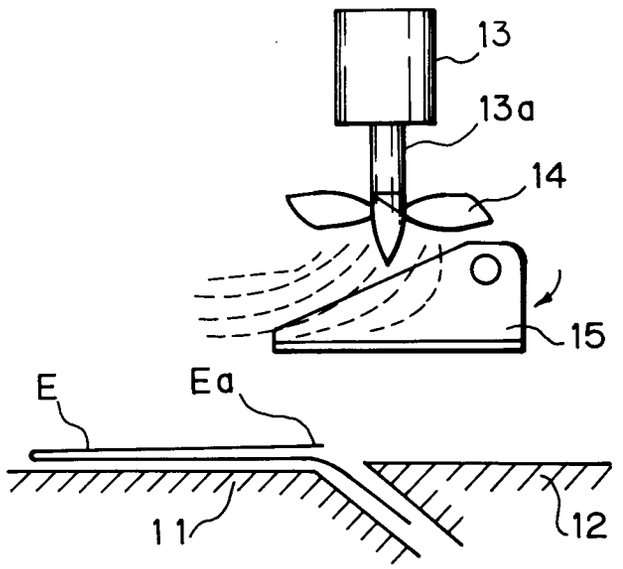


Fig. 2

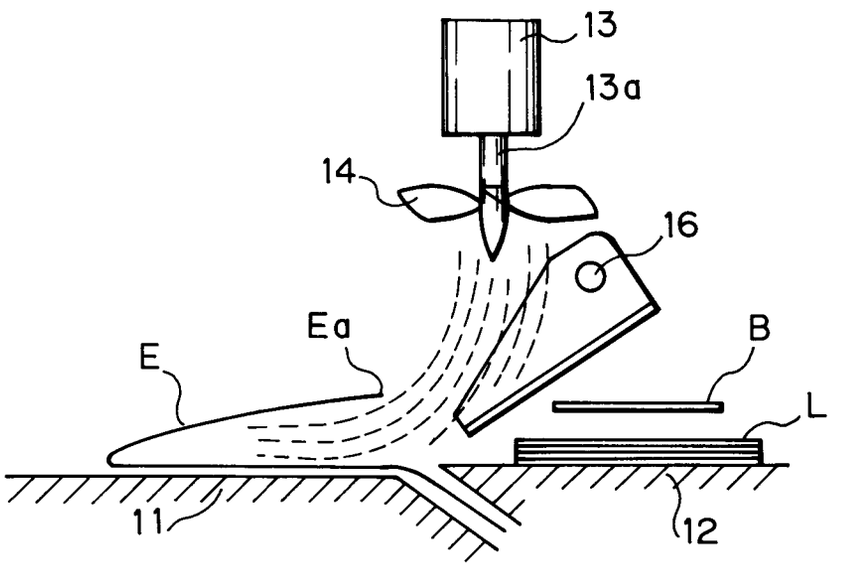


Fig. 3

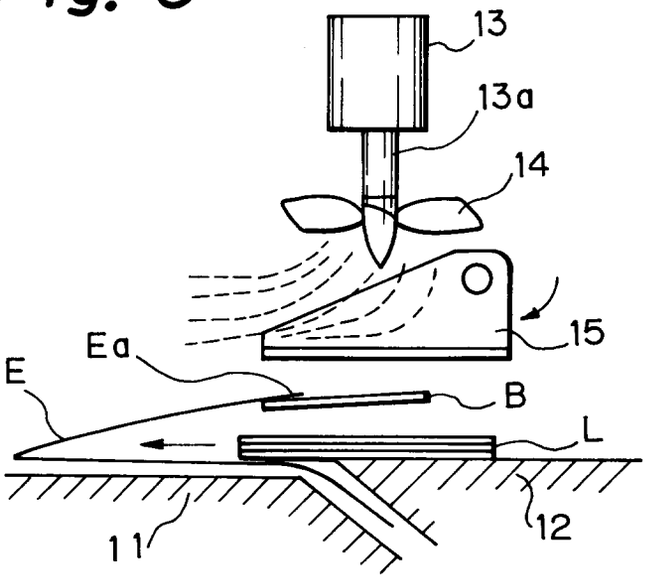
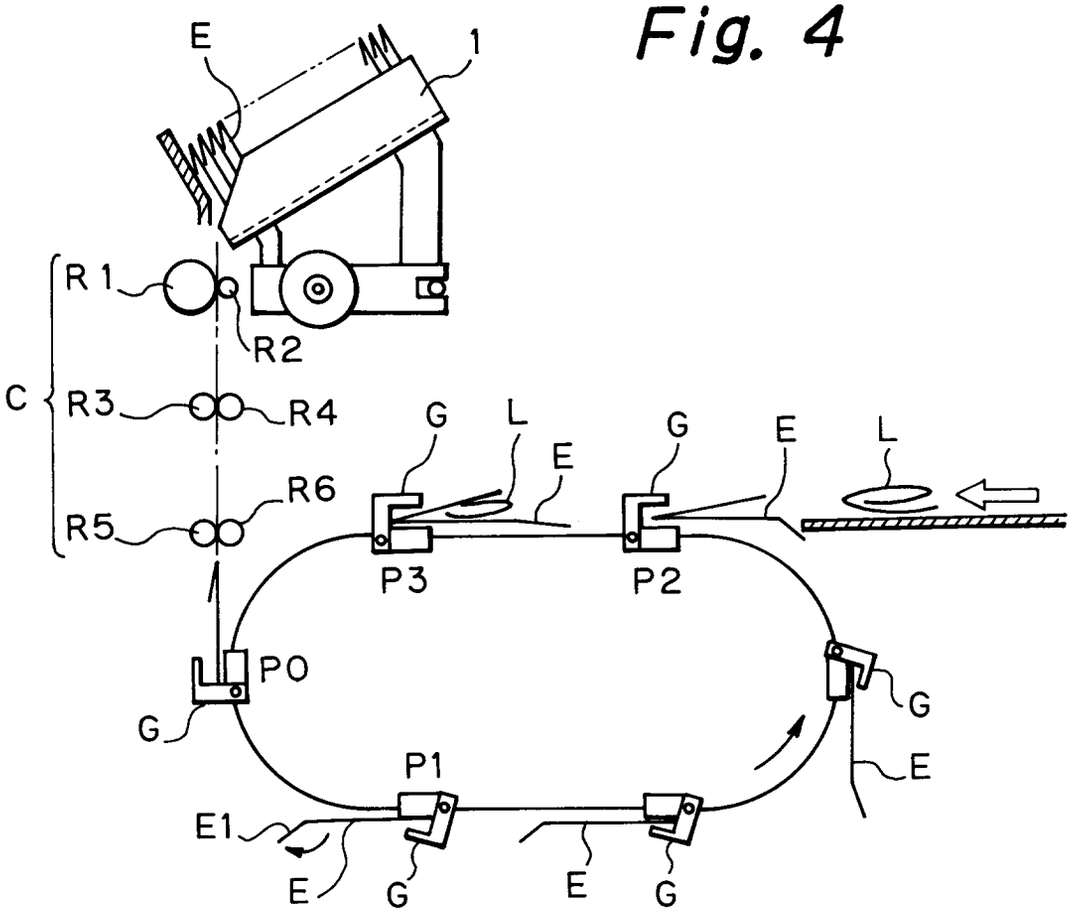

13
13a
14
15
Ea
E
B
L
11
12

Fig. 4


E
1
R1
R2
C
R3
R4
R5
R6
G
L
E
G
E
L
P3
P2
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G
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G

Fig. 5(a)

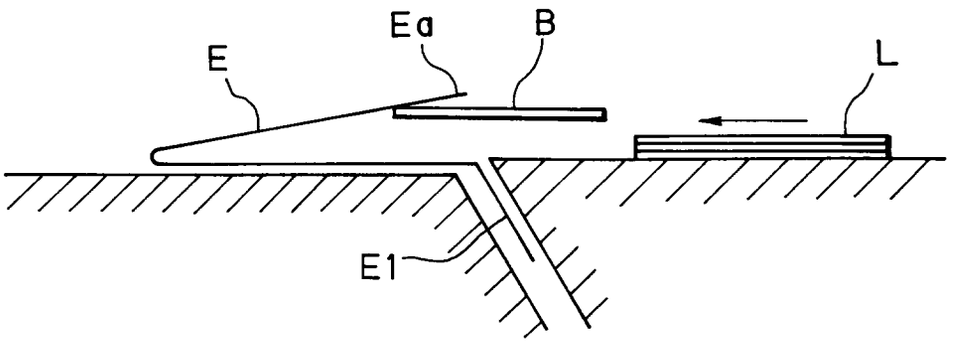


Fig. 5(b)

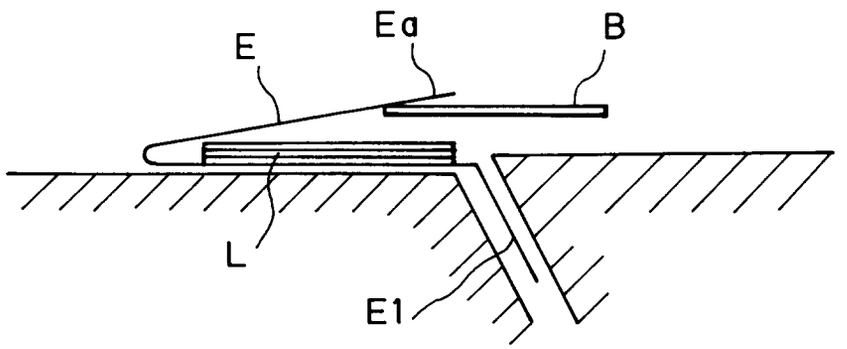
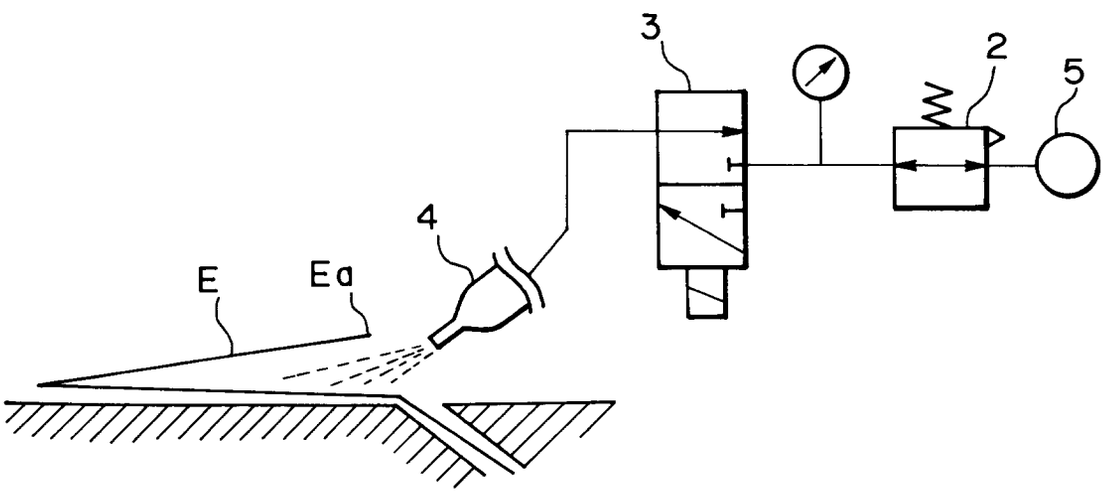


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 8111

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	PATENT ABSTRACTS OF JAPAN vol. 015, no. 120 (M-1096)25 March 1991 & JP-A-03 009 897 (DAIZOU ENG) 17 January 1991 * abstract *	1	B43M3/04
A	US-A-5 097 654 (LATSOUNAS ET AL.) * abstract; figures *	1	
A	DE-A-14 61 694 (STANDARD ELEKTRIK LORENZ) * page 2, paragraph 5; figure 2 *	1	
A	US-A-3 410 053 (BONSCH) * column 3, line 20 - line 24; figure 2 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

B43M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 January 1994	Perney, Y

CATEGORY OF CITED DOCUMENTS

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