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(54) Enveloping machine

(57) In an enveloping machine for introducing a set of sheets or inserts (1) into an envelope (10), a set of sheets (1) is placed by sheet feeding means on a sliding surface situated beneath the feeding means, in time relation with the passage of pushing lugs (3) which protrude from the sliding surface (2) and are connected to a conveying line (30) for conveying the set of sheets to an enveloping station (A) of the machine M. The machine (M) includes: an envelope feeder (4), which feeds the envelopes (10) one by one into a sliding interspace (T), defined by the sliding surface (2) and an upper guiding surface (5). Stopping means (6) keep each envelope (10) stopped in the station (A) during the introduction of the set of sheets (1) into the envelope (10) and opening means (7) act on the closing flap (11) to raise the rear facing (10a) of the envelope (10), so as to increase the opening section of the latter. Introducing means push the rear part (1b) of the set of sheets (1), to introduce the set of sheets into the respective envelope (10) and to transfer the envelope (10) with the set of sheets (1) introduced therein toward subsequent working stations.

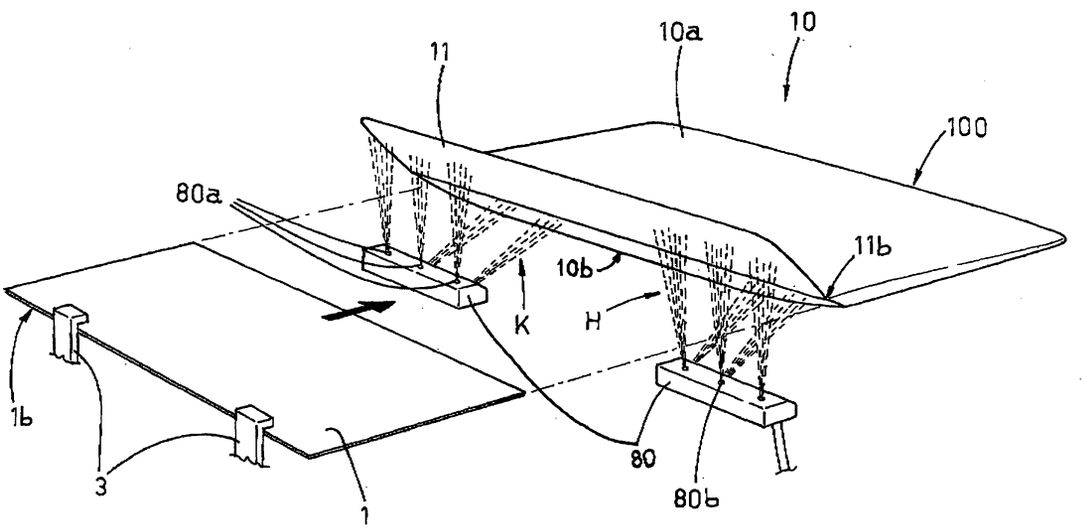

FIG. 2

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Description

[0001] The present invention relates to the technical field concerning introducing inserts into envelopes by automated apparatuses.

[0002] The manufacture and improvement of this kind of apparatuses has become necessary because of the increasing need to prepare big number of envelopes containing letters, various communication sheets, advertisement prints and the like to be sent to different addressees.

[0003] In many cases, the so-called "mailing" is entrusted to utility firms, other than the actual sender of the envelopes containing the documents being mailed, which perform the necessary enveloping operations.

[0004] Enveloping machines are divided substantially in two categories: the first one forms the envelopes from sheet material, while the other uses ready made envelopes.

[0005] The proposed invention relates to an enveloping machine belonging to the second category.

[0006] The object of the present invention is to propose an enveloping machine which is highly reliable and operationally flexible, obtained by means which are constructively simple and which requitr reduced maintenance operations.

[0007] Another object of the present invention is to propose an enveloping machine, which provides the above mentioned features and whose performance is higher than the one of known enveloping machines.

[0008] A further object of the present invention is to propose an enveloping machine which not only satisfies the previously mentioned requirements, but requires also a reduced room with respect to known machines.

[0009] The above mentioned objects are obtained in accordance with the content of the claims.

[0010] The characteristic technical-functional features of the proposed enveloping machine will be pointed out in the following description, with reference to the enclosed drawings, in which:

- Figure 1 is a schematic lateral view of a portion of the proposed machine;
- Figure 2 is an enlarged, partial and perspective view of the particular A of Figure 1;
- Figure 3 is a plan view of the particular A of Figure 1;
- Figure 4 is the same view as Figure 1 of one step of the working cycle of the enveloping machine;
- Figure 5 is the same view as Figure 1, pointing out alternative means for stopping the envelope.

[0011] With reference to the above figures, the reference letter M indicates the proposed enveloping machine, which automatically introduces a set 1 of various inserts and/or sheets into a respective envelope 10, which has a closing flap 11.

[0012] The machine M is operated in continuous way by motor means, which have not been shown, like other mechanisms operating some of the described means, as they are of known type.

[0013] The initial section of the machine, not shown, includes a series of feeding means, also known as sheet feeders, arranged in a line over a sliding surface 2, from which pushing means 3 protrude.

[0014] The pushing means 3, e.g. lugs, are arranged stepwise in a conveying line 30 (endless) under the surface 2, and are operated in the direction K of Figure 1.

[0015] The pushing means 3 protrude from corresponding longitudinal slots 32 made along the sliding surface 2.

[0016] Each sheet feeder drops a single sheet, or insert, on the sliding surface 2, situated below, in step relation with the passage of the above mentioned pushing ludg 3.

[0017] Thus, a set 1 of sheets or inserts is progressively formed.

[0018] The conveying line 30 conveys the set 1 of sheets to an enveloping station A.

[0019] An envelopes feeder 4, of known type, is fixed at the inlet of the station A, over the sliding surface 2 and includes a pair of small belts, whose relative runs 40a, 40b face each other.

[0020] The envelopes 10 go out from the runs 40a, 40b and are placed in a filling location P in the enveloping station.

[0021] The set 1 of sheets is moved forward on the sliding surface 2 and goes in abutment against elastic means 42, which are situated under the envelopes feeder 4 and which keep the set 1 of sheets pressed to the sliding surface 2.

[0022] The envelopes 10 are oriented with their rear face 10a turned upwards and their mouth and the respective flap 11 turned backwards with respect to the feeder ejection direction, which is in agreement with the forward direction K of the conveying line 30.

[0023] The envelope 10, ejected from the envelopes feeder 4, is thrown toward the filling location P defined by: the sliding surface 2; an upper guiding surface 5; stopping means 6 and means 7 for opening the envelope 10.

[0024] The upper guiding surface 5 is fixed above the sliding surface 2, at a distance "h" from the latter, so as to delimit an interspace "T", inside which the envelope 10 runs.

[0025] The distance "h" and the longitudinal position of the upper guiding surface 5 change in relation to the size of the envelope 10 and to the height of the set 1 of sheets.

[0026] The upper guiding surface 5 is formed by two portions: a first portion 5a, situated near the envelopes feeder 4 and inclined with respect to the sliding surface 2 to define a guiding slope for the envelopes, and a sec-

ond portion 5b, parallel to the sliding surface 2.

[0027] The portion 5b of the upper guiding surface 5 features longitudinal slots 50 e.g. two, whose function will be explained later.

[0028] The stopping means 6 include, as shown schematically in Figure 3: a longitudinal guide 60, fastened to the upper part the upper guiding surface 5; a fastening and longitudinal adjustment body 61, fixed removably to the longitudinal guide 60 and placed longitudinally in relation to the size of the envelope 10; a transverse bar 62 featuring brushes 63, which are situated symmetrically with respect thereto and which, in this particular case, are situated at the ends of the bar and in the longitudinal slots 50.

[0029] According to another solution, shown in Figure 5, the stopping means 6 include a longitudinal guide 60, a fastening and longitudinal adjustment body 61, a transverse bar 62, and removable stops 66, whose function will be explained later.

[0030] The bar 62 carries, hinged to its ends, two arms 64 equipped with relative counterbalances 65.

[0031] The opening means 7 are situated under the sliding surface 2, in the area of apertures 300, seen in Figure 3, made in the above surface.

[0032] The opening means 7, e.g. tubular elements 80 feature: holes 80a having vertical axis and made perpendicular to the closing flap 11 of the envelope and being fed with a jet of air H, and holes 80b having inclined axis, made crosswise with respect to the positioning of the envelope 10 mouth and being fed with a jet of air K

[0033] Further, over the sliding surface 2, there is a conveyor 28 formed by a counterweight 280 carried by an arm 281, which is fastened to the machine structure in known way.

[0034] The counterweight 280 is in abutment against a forward belt 29, which cooperates therewith to send the group C, obtained by the introduction of the set 1 of sheets into the envelope 10, to subsequent working stations.

[0035] Now, the sequence of working steps performed to introduce each set 1 of sheets into a respective envelope 10 will be described.

[0036] The envelope 10 is ejected from the feeder 4, in advance and in time relation with respect to the forward movement of the set 1 of sheets.

[0037] During the ejection, the tail part 100 of the envelope 10 rubs against the upper guiding surface 5, in particular by its first portion 5a, which guides the envelope into the running interspace T, so that the front surface 10b of the envelope touches the sliding surface 2, and consequently, the tail part 100 is intercepted by the stopping means 6, which keep the envelope in the above mentioned filling location P.

[0038] In step relation, the opening means 7 are actuated, i.e. the holes 80a, 80b are fed with respective jets of air H, K.

[0039] The jet of air H going out of the holes 80a hits the flap 11 and keep it raised above the sliding surface 2, that is keeps it adherent to the inclined portion 5a of the upper guiding surface 5, so that the hinge line 11b of the envelope matches the corner formed between the inclined portion 5a and the second portion 5b of the upper guiding surface 5.

[0040] The jet of air K going out of the holes 80b enters the envelope 10 opening, so as to raise the rear facing 10a of the envelope, the one with the flap, with respect to the front facing 10b, the one without the flap, until the rear facing 10a strikes against the second portion 5b of the upper guiding surface 5, to increase the envelope 10 opening section.

[0041] In step relation, the lugs 3 convey the set of sheets 1 into the envelope 10, as shown in Figure 4, introducing it up to a predetermined point, in which the rear part 1b of the set of sheets 1 is beyond the hinge line 11b of the envelope 10.

[0042] Then, the opening means 7 are deactivated and the lugs 3, overcoming the elastic reaction of the brushes 63, move forward the group C obtained by the introduction of the set of sheets 1 into the envelope 10, out of the enveloping station A, under the conveyor 28 and consequently, toward subsequent working stations.

[0043] With reference to the operation of the second embodiment of the stopping means 6, shown in Figure 5, the envelope ejection from the feeder 4 is similar, the envelope is guided into the sliding interspace T, so that the envelope front facing 10b touches the sliding surface 2, and consequently, the tail part 100 is intercepted by the stopping means 6.

[0044] The stopping means 6 define a movable stop, because: the arms 64, which involve the longitudinal slots 50, define an obstacle for the envelope 10 forward movement, and the counterbalances 65, lying against the removable stops 66, define the maximum lowering of the counterbalances 65, so as to maintain the working position of the arms 64.

[0045] The group C, obtained by the introduction of the set of sheets 1 into the envelope 10, moves forward pulled by the lugs 3.

[0046] As a consequence of the group C forward movement, the arms 64 raise, thus changing the working configuration and allowing the group C to pass.

[0047] Obviously, all the above described means of the machine M are adjustable in relation to the size of the envelope 10, within a predetermined interval.

[0048] It is to be pointed out how the proposed machine M allows to achieve the objects mentioned in the introduction, in terms of high reliability together with constructive simplicity.

[0049] Moreover, the high production rate is to be pointed out, obtained by high working speed and low number of downtimes.

[0050] All what above, together with limited dimensions and low costs, allow to consider the proposed machine extremely advantageous for utility firms, as well as for firms, which manage on their own the mailing activity.

Claims

1. Enveloping machine for introduction of a set (1) of sheets or inserts into an relative envelopes (10), with said set of sheets (1) placed by feeding means on a sliding surface situated below said feeding means, in time relation with the passage of the pushing lugs (3), which protrude from the sliding surface (2) and are connected to a conveying line (30), which conveys the set of sheets to an enveloping station (A) of the machine (M), said machine (M) being **characterized in that** it includes: an envelope feeder (4), which is situated at the inlet of said enveloping station (A) and which feeds said envelopes (10) one by one into a sliding interspace (T), delimited by said sliding surface (2) and an upper guiding surface (5), situated in a filling location (P) of said enveloping station (A), with said envelopes (10) oriented with a rear facing (10a) turned upwards and with the opening and the respective closing flap (11) turned backwards; stopping means (6), which keep each envelope (10) stopped in said filling location (P), during the introduction of said set of sheets (1) into said envelope (10); opening means (7), working in step relation with the stop of each envelope (10) in said location (P) and acting on the relative closing flap (11) to maintain the flap in a predetermined position, over said sliding surface (2), and raising said rear facing (10a) of the envelope (10) with respect to the front facing (10b), to increase the envelope opening section; introducing means acting on the rear part (1b) of said set of sheets (1), to introduce the set of sheets into the respective envelope (10) up to a predetermined point, in which said rear part (1b) is beyond the hinge line (11b) of said envelope (10) with said introducing means aimed also at transferring said envelope (10) with the set of sheets (1) introduced therein toward subsequent working stations.

2. Machine, according to claim 1, **characterized in that** said introducing means include pushing lugs (2), disposed stepwise along the conveying line (30).

3. Machine, according to claim 1, **characterized in that** the upper guiding surface (5) is fixed above the sliding surface (2) and includes two portions: namely a first portion (5a) which is situated in the area of the envelopes feeder (4) and inclined with respect to the sliding surface (2), and which is aimed at intercepting the tail part (100) of each envelope and at guiding the latter toward the sliding interspace (T), the first portion defining a stop for the flap (11) when the opening means (7) are operated; a second portion (5b) parallel to the sliding surface (2) and featuring longitudinal slots (50), partially engaged with the stopping means (6), with said second portion (5b) cooperating with the sliding surface to delimit said interspace (T) and aimed at receiving in abutment the rear facing (10a) when the opening means (7) are operated.

4. Machine, according to claim 1 or 3, **characterized in that** said stopping means (6) include: a longitudinal guide fastened to the upper part of the upper guiding surface (5); a fastening and longitudinal adjustment body (61), fixed removably to the longitudinal guide (60) and placed longitudinally in relation to the size of the envelope (10); a transverse bar (62) carrying brushes (63), which are situated symmetrically with respect thereto and in the longitudinal slots (50), to intercept the tail part (100) of the envelope, so as to stop the envelope and maintain it in the filling location (P).

5. Machine, according to claim 1 or 3, **characterized in that** said stopping means (6) include: a longitudinal guide fastened to the upper part of the upper guiding surface (5); a fastening and longitudinal adjustment body (61), fixed removably to the longitudinal guide (60) and placed longitudinally in relation to the size of the envelope (10); a transverse bar (62) carrying, hinged to its ends, a plurality of arms (64) equipped with relative counterbalances (65) lying against removable stops (66), with said arms (64) aimed at engaging with said longitudinal slots (50) to intercept the tail part (100) of the envelope, so as to stop the envelope and maintain it in the filling location (P).

6. Machine, according to claim 1, **characterized in that** said opening means (7) include tubular members (80), situated under the sliding surface (2) near the apertures (300) made therein, and featuring holes (80a) having vertical axis and made crosswise to the closing flap (11) of the envelope and being fed with a jet of air (H), which hits the flap (11) to keep it raised above the sliding surface (2), said tubular members featuring also holes (80b) having inclined axis, made crosswise with respect to the positioning of the envelope (10) opening and being fed with a jet of air (K) which hits the rear facing (10a) to keep it adherent to the upper guiding surface (5).

7. Machine, according to claim 1, **characterized in that** it includes, situated over the sliding surface (2), a conveyor (28) formed by a counterweight (280) carried by an arm (281), which is fastened to the machine structure, and which cooperates with a forward moving belt (29) to send the group (C), obtained by the introduction of the set of sheets (1) into the envelope (10), to subsequent working stations.

FIG.1

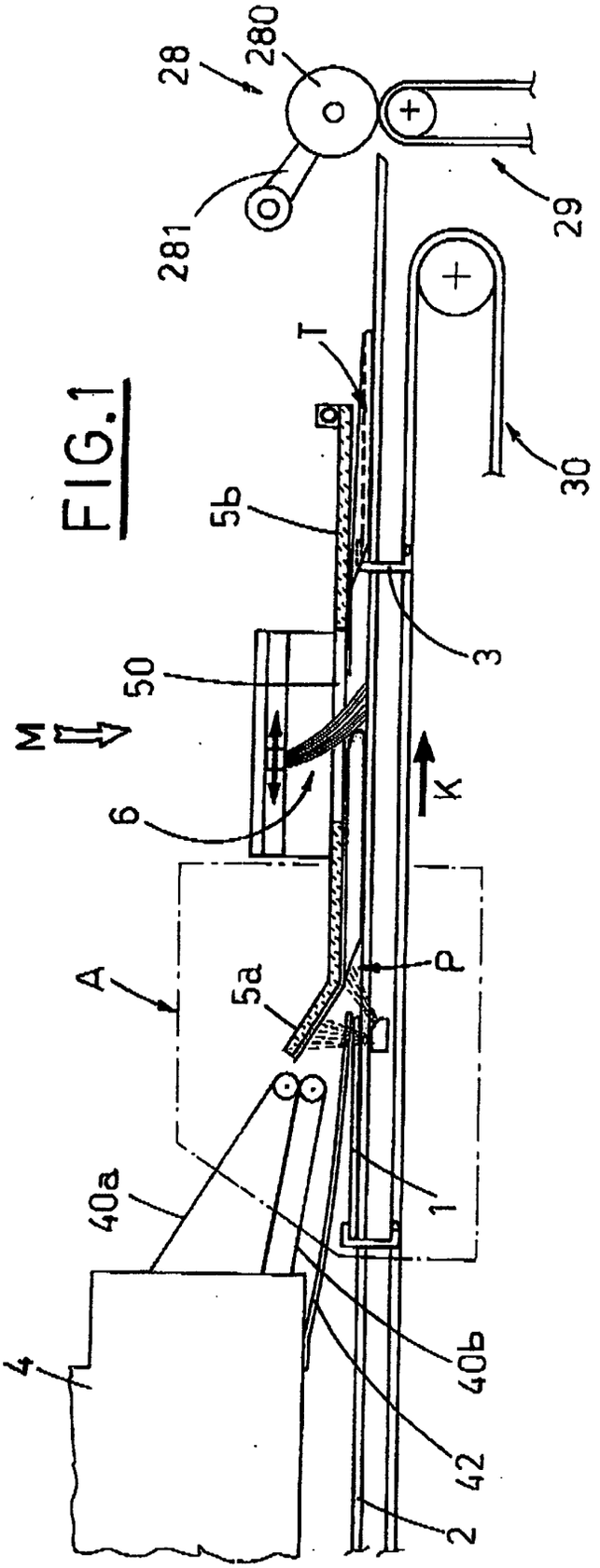
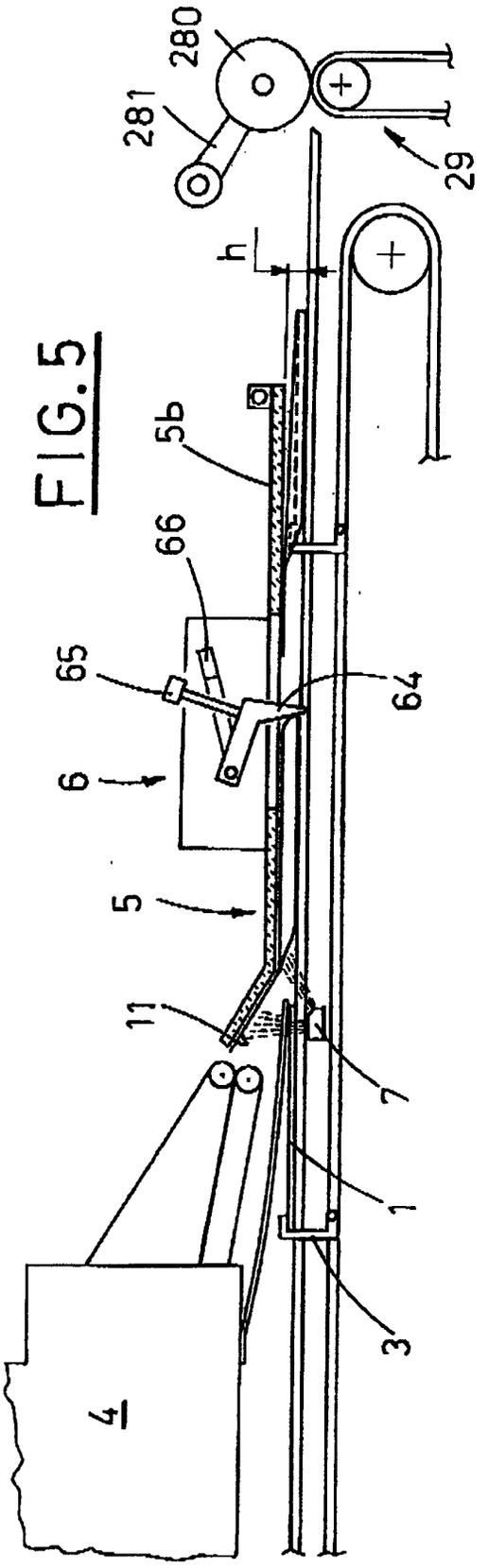

28
280
281
29
30
T
5b
3
50
M
6
K
A
5a
P
40a
1
4
40b
42
2

FIG.5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281
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h
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11
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1
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3

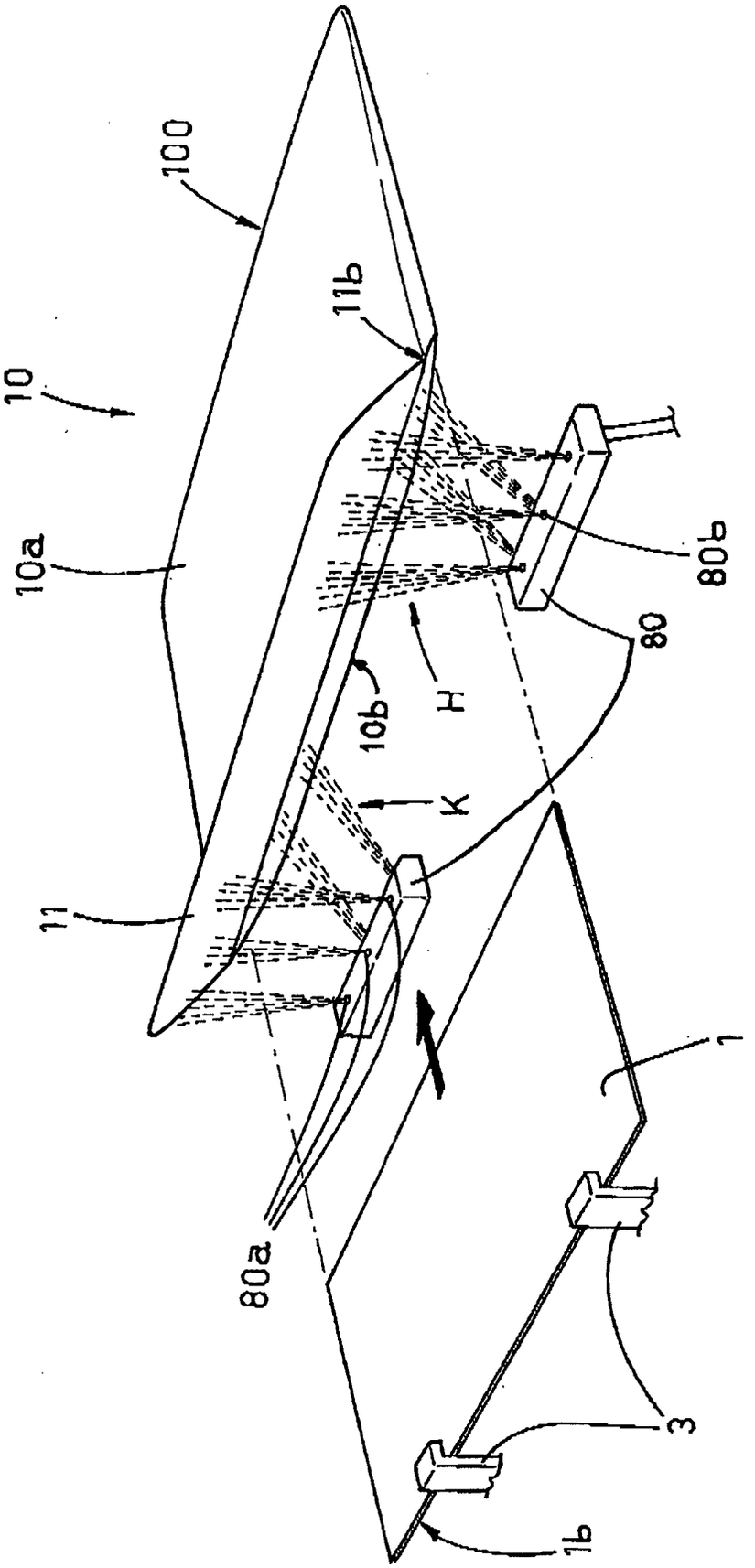

FIG.2

FIG.3

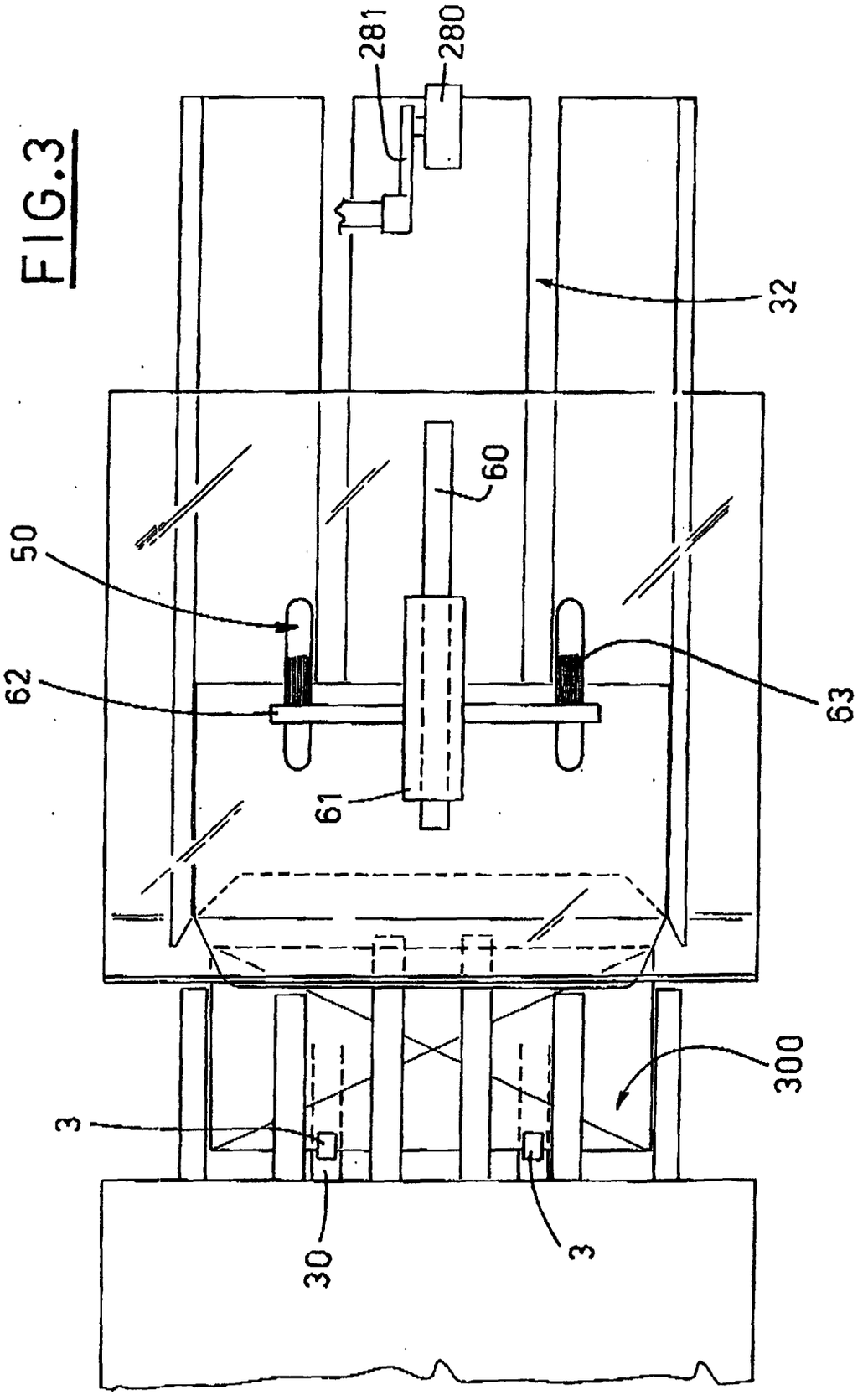

FIG.4