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(54) Device for forming and feeding ordered groups of fragile rod-shaped objects, particularly cigarettes.

(57) A device for forming and feeding ordered groups of fragile rod-shaped objects, particularly cigarettes, comprises a plurality of forming and transfer stations (S1, S1', S1'') for rows of cigarettes. Tubular housings (4) are made to pass next to the said stations and the individual rows of cigarettes are introduced into these housings in such a way that they are automatically superimposed over each other until the tubular housings (4) are completely filled. The invention provides stationary retaining means (7, 8) extending along the path of the tubular housings (4) from one station (S1, S1') to the next (S1', S1''), and holding in the correct position the rows of cigarettes introduced into and partially filling the housings (4) during the advance. The said retaining means (7, 8) consist of stationary guides with walls (207, 208) for superimposition on the ends of the cigarettes on the side on which a subsequent row is superimposed, and on at least one end of each cigarette.

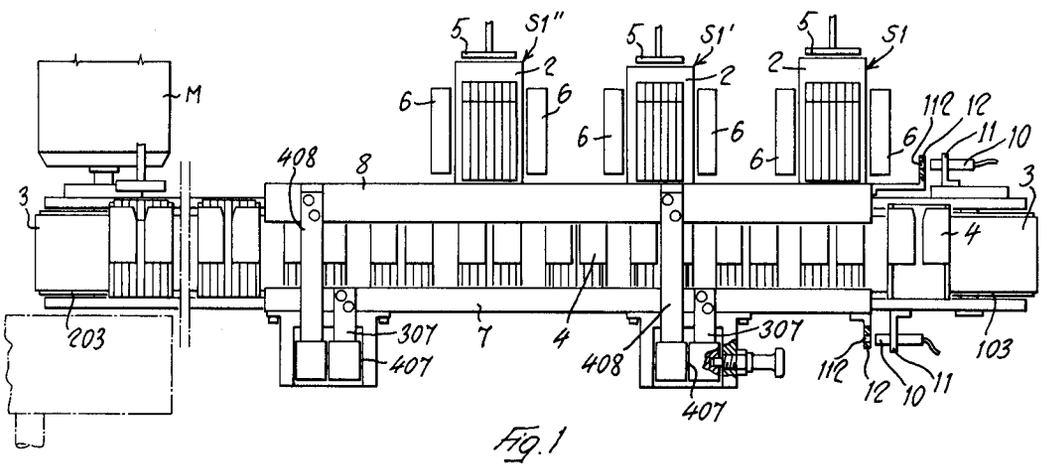

Fig. 1

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The invention relates to a device for forming and feeding ordered groups of fragile rod-shaped objects, particularly cigarettes, of the type comprising:

- means for forming a row of cigarettes, each row consisting of a predetermined number of cigarettes which are disposed directly adjacent to each other transversely with respect to their axes;
- at least two transfer stations, each for one row of cigarettes, each of these stations being associated with the means for forming the rows and the stations being disposed at a certain distance from each other and aligned transversely with respect to the axes of the cigarettes, while the rows of cigarettes in each transfer station are disposed so that they are staggered perpendicularly with respect to the stations and parallel to each other by an amount substantially equal at least to the diameter of the cigarettes between one transfer station and the next;
- a plurality of tubular housings open at one end at least and orientated parallel to each other and with their axes parallel to the axes of the cigarettes, these tubular housings being made to advance by predetermined steps transversely with respect to their axes and being brought one after another next to the transfer stations, in a position of axial insertion of the corresponding rows of cigarettes by transfer means and in which position the housings, the path of advance of the tubular housings being such that the row of cigarettes in each transfer station is positioned automatically with respect to the tubular housing in the position of superimposition on the row of cigarettes inserted at the preceding transfer station.

Since cigarette packing machines, in particular, generally operate at very high speeds, in devices of the type described initially for forming and feeding ordered groups of cigarettes there is a considerable risk that the cigarettes of the rows inserted in the tubular housings in the first transfer stations may move and become disposed incorrectly, as a result of the rapid accelerations and decelerations. In this case, the cigarettes in the row inserted subsequently are inevitably damaged, causing a fall in output or an increase in wastage, and possibly necessitating the stopping of the machine to remove the damaged cigarettes.

The object of the invention is to provide a device of the type described initially with which it is possible to avoid in a certain and extremely simple and economical way the disadvantages mentioned above, without restricting in any way the operating speed of the machine and without requiring additional moving parts which would have to be operated in synchronization with the remaining operating units of the machine.

The invention achieves the above objects with a device of the type described initially in which there are additionally provided means of retaining the individual rows of cigarettes in the correct position of insertion into the tubular housings during the advance of the tubular housings from one transfer station to the next, until the housings have been completely filled, the said means interacting with the free side of the row of cigarettes in the tubular housing on which the next row of cigarettes is to be superimposed, and consisting of at least one stationary guide which extends along the path of advance of the tubular housings and is superimposed on the said free side of the terminal portion of at least one end of each cigarette of the row which projects beyond the corresponding end of the tubular housing, the housings being made with an axial length smaller than that of the cigarettes.

The superimposed rows of cigarettes may advantageously be staggered axially with respect to each other as they are inserted into the corresponding tubular housing, so that at one end of the housing the ends of the cigarettes in the underlying rows project beyond the ends of the cigarettes in the upper rows, while the stationary retaining guide is made correspondingly in steps which form transverse stops interacting with the ends of the cigarettes and surfaces for superimposition on the terminal portions projecting from the cigarettes in each row, these surfaces interacting with the corresponding rows of cigarettes over the whole path of the tubular housings from the first transfer station to the final transfer station, means being provided after the final transfer station to align the individual rows of cigarettes in the tubular housing with each other in the transverse direction with respect to the axis of the cigarettes.

According to an improvement, the tubular housings are open at both ends and there is provided a stationary guide interacting also with the ends of the cigarettes projecting from the other ends of the tubular housings, the stationary retaining guide on the ends of the tubular housings facing the transfer stations being provided with apertures next to the stations for the passage of the rows of cigarettes.

The axial staggering of the superimposed rows of cigarettes is done in such a way that the ends of the cigarettes in the underlying rows project beyond those in the upper rows, at the ends of the tubular housings further from the transfer stations, while at the ends facing the stations the opposite disposition is found, with the ends of the cigarettes in the upper rows projecting beyond the ends of those in the underlying rows, the stationary retain-

ing guide at the ends of the tubular housings further from the transfer stations being made with continuous steps according to the axial staggering and the specified number of rows in the tubular housings, while the stationary guide at the ends facing the transfer stations is provided with a superimposition surface which engages, in succession according to the advance of the tubular housings from an up-line station to one immediately after it, only the row of cigarettes inserted at the said up-line transfer station, terminating at the up-line end of the following transfer station, the said superimposition surface being staggered by a step corresponding to the row of cigarettes inserted in the tubular housings, in the direction of advance of the housings, while the lower rows of cigarettes are retained only by those of the rows superimposed on them.

The opposed stationary guides also have surfaces which are transverse with respect to the axes of the cigarettes, along which the ends of the cigarettes slide, and which are spaced apart in the axial direction with respect to the cigarettes by an amount substantially equal to or slightly greater than the length of the cigarettes, the said surfaces corresponding to the elevations of the steps of the stationary retaining guide at the ends of the tubular housings further from the transfer stations, while the stationary retaining guide at the ends of the tubular housings facing the transfer stations has segments of transverse surface, each located between one transfer station and the next and staggered axially by a step with respect to the up-line segment by an amount corresponding to the axial staggering of the rows of cigarettes, while the remaining underlying rows of cigarettes inserted in the preceding transfer stations are axially free.

The invention also relates to other characteristics which further improve the device described above and which form the subject of the dependent claims.

The particular characteristics of the invention, and the advantages derived therefrom, will be shown in greater detail by the description of a preferred embodiment of the invention, illustrated solely by way of example and without restriction in the attached drawings, in which:

Fig. 1 is a plan view from above of a device according to the invention.

Fig. 2 is a front view of the transfer stations and of the associated stationary retaining guide.

Fig. 3 is a front view of the stationary retaining guide at the ends of the tubular housings further from the transfer stations, the steps of the guide being shown in broken lines.

Fig. 4 is a schematic plan view from above of the disposition of the two stationary retaining guides and of the transfer stations.

Figs. 5 to 9 are views in transverse section at different points of the retaining guides in which are shown the different stages of operation of the device.

Fig. 10 shows a lateral view of the device according to the invention in the direction of advance of the cassette conveyor.

The illustrated device relates in particular to a cigarette packing machine, in which the packets of cigarettes are formed by wrapping around a group of cigarettes, arranged in the same order as that of the cigarettes in the finished packet, the various layers of packaging material which form the packet.

The machine is therefore provided, before the operating units for the formation of the packet, with a device for forming ordered groups of cigarettes. The said device comprises a vertical feed hopper in which the individual cigarettes are housed and which has three channels 1, 1', 1'' for forming rows of cigarettes, these channels being known in themselves and each being capable of depositing a row of adjacent cigarettes with a predetermined number of cigarettes on a horizontal surface 2 in an associated transfer station S1, S1', S1''. The channels 1, 1', 1'' for forming rows of cigarettes are disposed at equal distances from each other and are aligned with each other transversely with respect to the axes of the cigarettes. The transfer surfaces 2 are made to be staggered parallel to each other at different heights, increasing by an amount substantially equal to the diameter of the cigarettes in the direction of advance of a continuous conveyor device which is provided with a plurality of tubular housings, known as a cassette belt. At each transfer station S1 to S1'', the rows of cigarettes are orientated parallel to each other. The cassette conveyor consists of a conveyor belt 3, whose upper conveyor section extends horizontally and before and parallel to the row of transfer stations S1, S1', S1''. The said belt 3 is run around pulleys 103, 203, at least one of which is rotated by a motor M and carries a plurality of tubular housings 4 which are distributed at equal distances from each other on the belt. The tubular housings 4 are open at their ends and are orientated with their axis transverse with respect to the conveyor belt 3 and parallel to the axes of the cigarettes in the transfer stations S1, S1', S1''. They have a rectangular transverse section capable of housing three superimposed rows of cigarettes. The upper section of the conveyor belt 3 extends at a level with respect to the transfer surfaces 2 such that at each transfer station S1, S1', S1'' the corresponding rows of cigarettes are provided at a level corresponding to that of the filling layer of the tubular housing 4 which the said row is intended to occupy at the time of insertion into the housing 4. The rows of cigarettes are inserted by axial pushers 5 of a

known type. The rows may advantageously be slightly compressed transversely with respect to their axes by opposing closing means 6 before their insertion, while the ends of the tubular housings 4 facing the transfer stations S1, S1', S1'' are suitably flared to facilitate entry. The conveyor belt 3 is made to advance in steps by which each tubular housing 4 is brought successively up to the next transfer station S1, S1', S1'', in the position of axial insertion of the corresponding row of cigarettes. The tubular housings 4 are also made shorter than the axial length of the cigarettes, at least on their vertical sides and on the upper side further from the belt 3, so that at the insertion position the cigarettes project beyond both ends of the said tubular housings 4. At the ends of the tubular housings 4 further from the transfer stations S1, S1', S1'' there is provided a first stationary guide 7 which consists of a shaped strip 7 suspended from above by two brackets 307. The brackets 307 are hinged at 407 to the frame of the device so that they can oscillate about a horizontal axis parallel to the stationary guide 7, enabling the guide to oscillate between a position lowered against the cassette belt and a position raised angularly away from the belt, so that the tubular housings 4 are easily accessible from the said end for manual servicing or maintenance operations.

As is also shown in Figs. 3 to 7, the said first stationary guide 7 has a profile widening by steps towards the facing end of the tubular housings on the side facing the tubular housings, and from the lower to the upper side of the guide 7. In particular, it has three steps, whose vertical sides 107, parallel to the ends of the cigarettes, form axial end stops for the introduction of the cigarettes and have heights substantially equal to or preferably slightly greater than the diameter of the cigarettes. The individual rows of cigarettes in each tubular housing are therefore disposed so that they are staggered axially with respect to each other according to the reciprocal axial staggering of the vertical sides 107 of the steps, while the horizontal sides 207 of the steps projecting towards the ends of the tubular housings 4 form horizontal surfaces which are superimposed with a suitable free space on the terminal portions at the facing ends of the cigarettes in the corresponding rows. Because of this arrangement, in the condition of partial filling of the tubular housings the corresponding rows of cigarettes are retained at least at one of their ends in their correct insertion position, preventing them from being displaced into positions such that they interfere with the rows of cigarettes which are introduced in a following transfer station with consequent damage to the product. Obviously, the horizontal projection of the steps in the axial direction, in other words of their horizontal sides 207, is such that the stationary guide 7 is sufficient spaced from the corresponding ends of the tubular housings 4.

In order to obtain a further retaining action on the ends of the cigarettes facing the transfer stations S1, S1', S1'', a second retaining guide 8 is provided between the corresponding ends of the tubular housings 4 and the output end of the transfer stations, and is supported in a way similar to the first guide 7 and has similar functions to the first guide. At the insertion end of the tubular housings 4, the rows of cigarettes are staggered in the opposite way, the ends of the cigarettes in the upper layers projecting beyond those in the lower layers (Figs. 4 to 8). Consequently, as a result of what has been described previously, the guide 8 has a plurality of successive portions which extend from the up-line end of a transfer station S1, S1' to the up-line end of the following transfer station S1', S1'', while the portion of guide next to the final transfer station S1'' is made in such a way as to provide a vertical realignment of the rows of cigarettes in the tubular housings 4.

As shown in Figs. 2 and 4 to 8 in particular, each portion of the guide 8 has a horizontal superimposition surface 208, 208' at the free upper side of the ends of the cigarettes of the row inserted at the transfer station S1, S1' associated with the said portion. The horizontal superimposition surface 208, 208' of the individual guide segments are staggered vertically with respect to each other with steps in the direction of advance, corresponding to the associated rows of cigarettes. Similarly, the individual segments of the guide 8 have vertical guide surfaces 108, 108' interacting with the ends of the cigarettes which extend only between the down-line end of a transfer station S1, S1' and the up-line end of the following transfer station S1', S1'', and which are staggered with respect to each other with a step corresponding to the axial staggering of the row of cigarettes inserted in the tubular housings 4 at the transfer station S1, S1' directly up-line from the said surface 108, 108'. In this way, apertures 308 are formed next to the transfer stations S1, S1', S1''. The portions of guide 8 with the associated surfaces 108, 108' and 208, 208' interact only with the row of cigarettes inserted into the tubular housings 4 at the associated transfer station S1, S1', while the lower rows of cigarettes are free and are retained only by the action exerted on them by the cigarettes of the overlying rows.

According to a further characteristic shown in Figs. 4 to 7, in order to provide an action of retention of the corresponding lower row of cigarettes next to the transfer station S1', S1'' for the row of cigarettes directly superimposed on it, the transfer surfaces 2 are extended in the direction of the tubular housings 4 with superimposition blades

9 which terminate at a certain distance from the tubular housings, but are superimposed in a similar way to the horizontal surface 208, 208' of the preceding portion of guide 8 at the ends of the cigarettes of the row directly underlying the row to be inserted.

When, as in the case illustrated which is generally used in cigarette packing, the ordered group of cigarettes consists of three superimposed rows, in which each outer row has an identical number of cigarettes while the intermediate row has one cigarette less and is disposed in a quincuncial arrangement with the other two, the thickness of the first two rows of cigarettes in the said disposition is less than twice the diameter of the cigarettes. Since the superimposition blade 9 prevents a quincuncial disposition of the intermediate row of cigarettes at least in the area of the corresponding ends (Figs. 6 and 7), the horizontal surface of the portion of guide 8 associated with the transfer station S1' of the said intermediate row and extending to the up-line end of the following transfer station S1'' for the third and final row of cigarettes has, as shown in Fig. 2, an initial horizontal portion provided at a level substantially equal to or slightly greater than twice the diameter of the cigarettes and a subsequent portion 208''' inclined slightly downwards, to compensate for the difference in thickness between the superimposed rows when the two rows are disposed in a quincuncial arrangement in the area between the two stations S1' and S1''.

This arrangement is not necessary for the segment of guide associated with the final transfer station S1'', since the insertion of the corresponding row completes the filling of the tubular housings 4 and the cigarettes retain each other in their correct position.

The guide 8 and the guide 7 also extend beyond the final transfer station S1'' for the final row of cigarettes to be inserted into the tubular housings 4. In this terminal portion, the guide 7 at the ends of the tubular housings 4 further from the transfer stations S1, S1', S1'' has a vertical surface 107'' which is aligned with the vertical surface of the elevation of the lowest step interacting with the lowest row of cigarettes projecting furthest from the tubular housing 4 (Figs. 4, 8 and 9). The said surface 107'' extends over the whole height of the tubular housings 4. The said terminal portion also has a horizontal surface 207'' which forms an extension of the horizontal surface 207 of the final uppermost step of the guide 7 and which extends over a length equal to the overall staggering of the rows with respect to each other. The corresponding terminal portion of the opposing guide 8, however, has a vertical surface 108'' which is inclined in the axial direction with respect to the cigarettes towards the opposing guide 7, the end next to the down-line end of the transfer station S1'' being spaced from the facing vertical surface 107'' of the opposing guide 7 by an amount corresponding to the length of the cigarettes plus the axial projection of the final uppermost row of cigarettes with respect to the lowest, while the downline end of the said inclined vertical surface 108'' is disposed at a distance from the opposing vertical surface 107'' substantially equal to or preferably slightly greater than the length of the cigarettes. Consequently, as shown in Figs. 4, 8 and 9, the passage of the tubular housings 4 between the two terminal portions of the two opposing guides 7 and 8 causes the progressive vertical alignment of the ends of the cigarettes with each other, thus removing the axial staggering produced at the stage of progressive filling of the tubular housings 4. The said terminal portion of the guide 8 also has a horizontal superimposition surface 208'' at the ends of the cigarettes of the final uppermost row inserted at the said final station S1'', in a similar way to the portions of the said guide provided up-line.

The guides 7 and 8 being both supported by the pivotable brackets 307 and 408 can be raised angularly away from the conveyor belt 3. In the raised position the cigarettes in the stations S1, S1',S1'' and the facing sides of the tubular housings 4 can be directly seen, thus simplyfing noticeably the operations for adjusting the alignment between the cigarettes in the stations S1, S1' and S1'' and the corresponding tubular housing 4.

According to a further improvement of the invention, as shown in figures 1 and 10, the guides 7 and 8, i.e. the brackets 307, 408 are freely pivotable and the guides 7, 8 provided in combination with means for detecting the angular displacement of the same ones.

Detecting means of any suitable kind can be applied, in the embodiment of figures 1 and 10 the guides 7 and 8 are associated to electro-optical displacement detectors which are formed by an integrated light beam emitter/receiver unit 10 which is supported by a stationary part of the frame 11 and which is oriented with the axis of the emitted beam parallel to the longitudinal axis of the corresponding guide 7 and 8 facing the emitter/receiver unit 10. The reflectors 12 have a reflecting surface which is transversal to the emitted beam and to the longitudinal axis of the guides 7,8. This surface shows a hole 112 being placed in such a way that in the operative position of the guides 7 and 8 it is coaxial to the emitted beam which passes through it without being reflected. An angular displacement of the guides 7,8 causes a displacement of the hole 112 with respect to the emitted beam which falls onto the reflecting surface around the hole 112. The emitter/receiver unit 10 generates a control signal which can be fed to a

central control unit for example for stopping the machine or at least the pushers 5 and perhaps also the belt 3.

The above described combination results noticeably advantageous in the eventuality of cigarettes jam during transfer from the stations S1, S1',S1'' to the tubular housings 4. Occurring a cigarette jam, the freely angularly displaceable guides 7 and 8 will be raised by the jammed cigarettes material compressed, for example, in the passages under the superimposition horizontal surfaces 208, 208', 208'' of the guide 8 or against the surfaces 107, 207 of the opposite guide 7. The signal generated by the emitter/receiver unit 10 leads to an immediate machine stop command. This procedure for stopping the machine takes place in a fraction of the time normally needed by a person to even only to realize a jam has occurred. The rapidity in stopping the machine or at least the pushers has a great importance in order to avoid damaging of the operational rogans and devices which might be caused by the continuous progressive compression of successive cigarettes on the jammed ones between the stations and the tubular housings forming a very compact obstacle.

Claims

1. Device for forming and feeding ordered groups of fragile rod-shaped objects, particularly cigarettes, of the type comprising:
   - means (1, 1', 1'', 2) for forming a row of cigarettes, each row consisting of a predetermined number of cigarettes which are disposed directly adjacent to each other transversely with respect to their axes;
   - at least two transfer stations (S1, S1', S1''), each for one row of cigarettes, each of these stations being associated with the means (1, 1', 1'', 2) for forming the rows and the stations (S1, S1', S1'') being disposed at a certain distance from each other and aligned transversely with respect to the axes of the cigarettes, while the rows of cigarettes in each transfer station (S1, S1', S1'') are disposed so that they are staggered perpendicularly with respect to the stations and parallel to each other by an amount substantially equal at least to the diameter of the cigarettes between one transfer station (S1, S1') and the next (S1', S1'');
   - a plurality of tubular housings (4) open at one end at least and orientated parallel to each other and with their axes parallel to the axes of the cigarettes, these tubular housings (4) being made to advance by predetermined steps transversely with respect to their axes and being brought one after another next to the transfer stations (S1, S1', S1''), in a position of axial insertion of the corresponding rows of cigarettes by transfer means (5) and in which position the housings, the path of advance of the tubular housings being such that the row of cigarettes in each transfer station (S1, S1', S1'') is positioned automatically with respect to the tubular housing (4) in the position of superimposition on the row of cigarettes inserted at the preceding transfer station (S1, S1', S1''), characterized in that there are also provided means (7, 8) of retaining the individual rows of cigarettes in the correct position of insertion into the tubular housings (4) during the advance of the tubular housings (4) from one transfer station (S1, S1') to the next (S1', S1''), at least until the housings have been completely filled, the said means (7, 8) interacting with the free side of the row of cigarettes in the tubular housing (4) on which the next row of cigarettes is to be superimposed, and consisting of at least one stationary guide surface (207, 207'; 208, 208', 208'', 208''') which extends along the path of advance of the tubular housings (4) and is superimposed on the said free side of the terminal portion of at least one end of each cigarette of the row which projects beyond the corresponding end of the tubular housing (4), the housings being made with an axial length smaller than that of the cigarettes.

2. Device according to Claim 1, characterized in that the superimposed rows of cigarettes are inserted into the corresponding tubular housing (4) so that they are staggered axially with respect to each other, in such a way that at one end of the housing (4) the ends of the cigarettes of the underlying rows project beyond the ends of the cigarettes of the upper rows, while the stationary retaining guide (7) is made with corresponding steps which form transverse stop surfaces (107) interacting with the ends of the cigarettes and surfaces for superimposition (207) on the projecting terminal portions of the cigarettes in each row, each of these surfaces interacting with one of the rows of cigarettes over the whole path of the tubular housings (4) from the first to the final transfer station (S1, S1', S1''), while means

(107'', 108'') are provided down-line from the final transfer station (S1'') to align the individual rows of cigarettes in the tubular housings with each other in the transverse direction with respect to the axes of the cigarettes.

3. Device according to Claim 1 or 2, characterized in that the tubular housings (4) are open at both ends and there is provided a stationary guide (8) interacting also with the ends of the cigarettes projecting from the other ends of the tubular housings, the stationary retaining guide (8) on the ends of the tubular housings (4) facing the transfer stations being provided with apertures (308) next to the stations for the passage of the rows of cigarettes.

4. Device according to one or more of the preceding claims, characterized in that the axial staggering of the superimposed rows of cigarettes is done in such a way that the ends of the cigarettes in the underlying rows project beyond those in the upper rows, at the ends of the tubular housings (4) further from the transfer stations (S1, S1', S1''), while at the ends facing the stations the opposite disposition is found, with the ends of the cigarettes in the upper rows projecting beyond the ends of those in the underlying rows, the stationary retaining guide (7) at the ends of the tubular housings (4) further from the transfer stations (S1, S1', S1'') being made with continuous steps according to the axial staggering and the specified number of rows in the tubular housings (4), while the stationary retaining guide (8) at the ends facing the transfer stations (S1, S1', S1'') is provided with a superimposition surface (208, 208', 208'', 208''') which engages, in succession according to the advance of the tubular housings (4) from an up-line station (S1, S1') to one (S1', S1'') immediately after it, only the row of cigarettes inserted at the said up-line transfer station, terminating at the up-line end of the following transfer station (S1', S1''), the said superimposition surface (208, 208', 208'', 208''') being staggered by a step corresponding to the row of cigarettes inserted in the tubular housings (4), in the direction of advance of the housings, while the lower rows of cigarettes are retained only by those of the rows superimposed on them.

5. Device according to one or more of the preceding claims, characterized in that the opposed stationary guides (7, 8) also have surfaces (107, 108, 108') which are transverse with respect to the axes of the cigarettes, along which the ends of the cigarettes slide, and which are spaced apart in the axial direction with respect to the cigarettes by an amount substantially equal to or slightly greater than the length of the cigarettes, the said surfaces corresponding to the elevations of the steps of the stationary retaining guide (7) at the ends of the tubular housings further from the transfer stations, while the stationary retaining guide (8) at the ends of the tubular housings (4) facing the transfer stations (S1, S1', S1'') has segments of transverse surface (108, 108'), each located between one transfer station (S1, S1') and the next (S1', S1'') and staggered axially by a step with respect to the up-line segment by an amount corresponding to the axial staggering of the rows of cigarettes, while the remaining underlying rows of cigarettes inserted in the preceding transfer stations (S1, S1') are axially free.

6. Device according to one or more of the preceding claims, characterized in that the opposed guides (7, 8) have terminal portions extending beyond the final transfer station for the final row of cigarettes to be inserted into the tubular housings (4), the guide (7) at the ends further from the transfer stations (S1, S1', S1'') being provided with a transverse surface (107'') which is aligned with the transverse surface (107) of the step associated with the rows of cigarettes projecting furthest from the associated ends of the tubular housings (4), while the opposing guide (8) is provided with a transverse wall (108'') which is inclined towards the opposing guide (7) in a way corresponding to the staggering of the final rows of cigarettes inserted into the tubular housings (4) at the final transfer station (S1''), both transverse walls extending over the whole section of the tubular housings (4).

7. Device according to Claim 6, characterized in that the terminal portions of the guides (7, 8) beyond the final transfer station (S1'') may be provided with a superimposition surface (207'', 208'') only at the corresponding ends of the cigarettes of the final row inserted into the said final transfer station (S1'').

8. Device according to one or more of the preceding claims, characterized in that at the apertures (308) for the passage of the rows of cigarettes in the guide (8) on the side of the transfer stations (S1', S1''), particularly after the first transfer station (S1), there is provided a superimposition blade (9) at the ends of the cigarettes facing the said transfer station (S1', S1'') of the row of cigarettes inserted at the

preceding transfer station, this superimposition blade (9) being mounted so that it projects towards the tubular housings (4) from a supporting member (2), in other words a transfer surface provided at the said station, and extends flush with the transfer surface (2), and substantially flush with the vertical superimposition surface (208, 208') of the portion of guide (8) between the said transfer station (S1'', S1') and the preceding transfer station (S1', S1) which is interrupted by the aperture (308).

9. Device according to Claim 8, characterized in that there are inserted into the tubular housing at least two and preferably three rows of cigarettes, one superimposed on another, one row, preferably the intermediate, being disposed in a quincuncial arrangement with the immediately underlying row, and a superimposition blade (9) being provided which is interposed between the ends of the underlying row of cigarettes and the ends of the overlying row of cigarettes, while the superimposition surface of the guide (8) for the said quincuncial row is provided with an initial portion at the transfer station (S1', S1'') which is superimposed on the row of cigarettes not in the quincuncial position, and with a subsequent terminal portion (208''') inclined progressively towards the row of cigarettes interacting with it, by an amount corresponding to the difference between the non-quincuncial and the quincuncial disposition.

10. Device according to one or more of the preceding claims, characterized in that the transfer surfaces (2) of the rows of cigarettes are disposed horizontally and are staggered by a height corresponding to the difference of substantially one diameter of a cigarette between one transfer station (S1, S1') and the next (S1', S1''), while the tubular housings (4) are carried by a continuous conveyor belt (3) whose upper horizontal section is placed at a level such that each row of cigarettes on the corresponding transfer surface (2) is automatically placed at the height of the position which it takes up in the tubular housing at the time of insertion, the superimposition surfaces (207, 207') and (208, 208', 208'') of the guides (7, 8) being horizontal and the transverse surfaces (107, 107'', 108, 108', 108'') being vertical.

11. Device according to one or more of the preceding claims, characterized in that the one or both the guides (7, 8) are supported (307, 408) in a displaceable way from their operative positions with respect to the conveyor belt (3) and to the stations (S1, S1', S1'').

12. Device according to claim 11, characterized in that one or both the guides (7, 8) are hinged (307, 408) in a angularly displaceable way around an axis parallel to their longitudinal axis and in such a way as to be angularly raiseable away from their operative position, i.e. away from the conveyor belt (3).

13. Device according to claims 11 or 12, charachterized in that one or both the guides (7, 8) are supported (307, 408) in a freely angularly displaceable way, means being provided (10, 12) for detecting an angular displacement of one or both the guides (7, 8).

14. Device according to claim 13, characterized in that the angular displacement detecting means (10, 12) are connected to a central control unit generating a stop command for the machine or at least of the transfer means (5) and perhaps of the cassette conveyor (3, 4) when a angular displacement signal is emitted by the detector (10, 12).

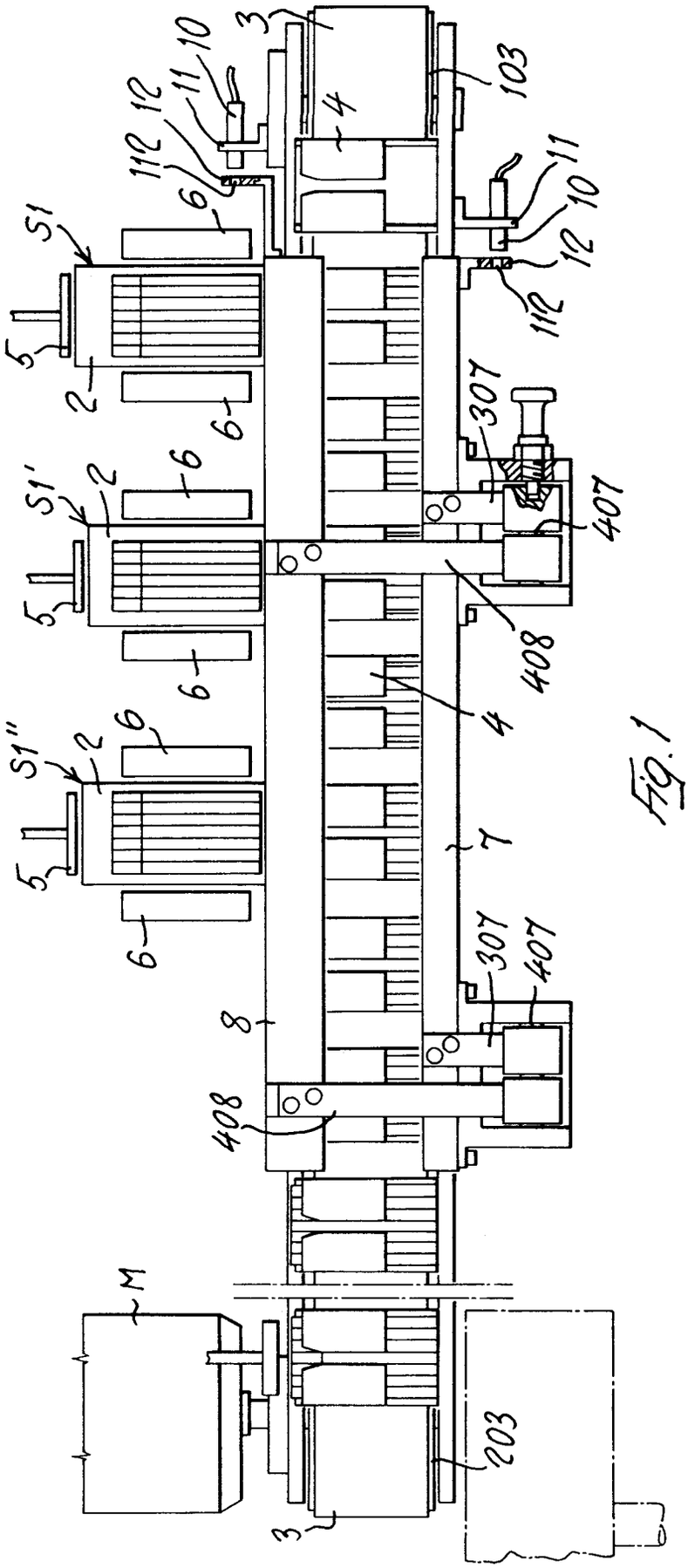

Fig. 1

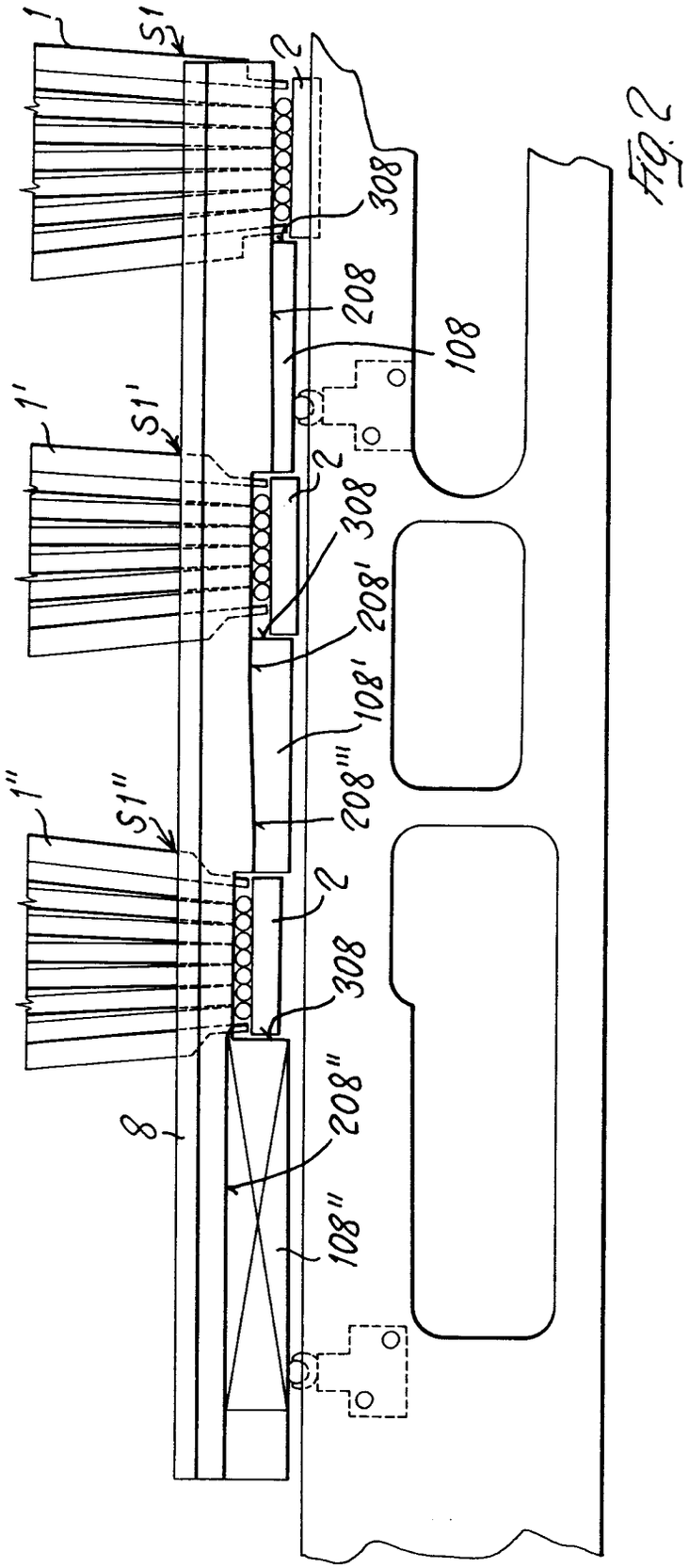
1
S1
2
308
208
108
1'
S1'
2
308
208'
108'
1''
S1''
2
308
208''
108''
8

Fig. 2

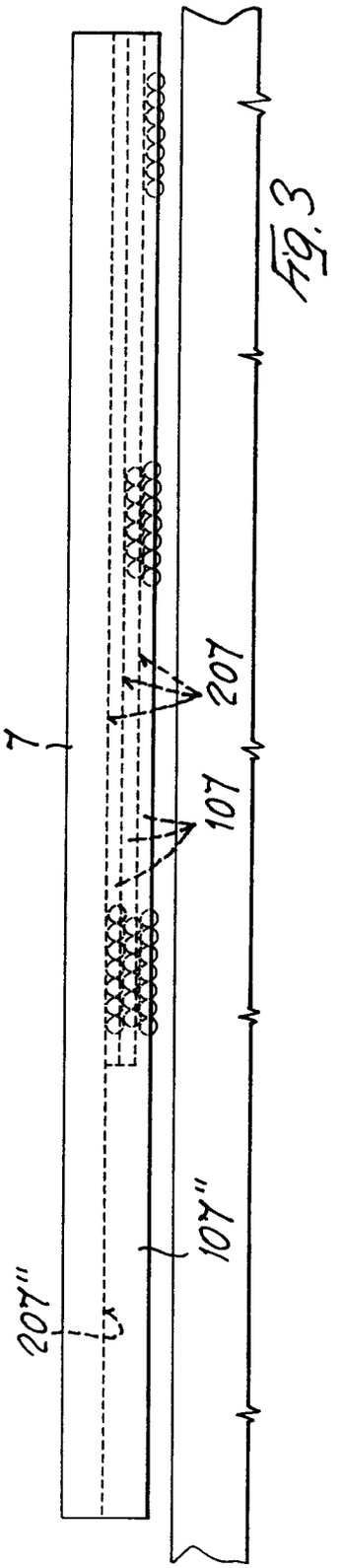
7
207
107
107''
207''

Fig. 3

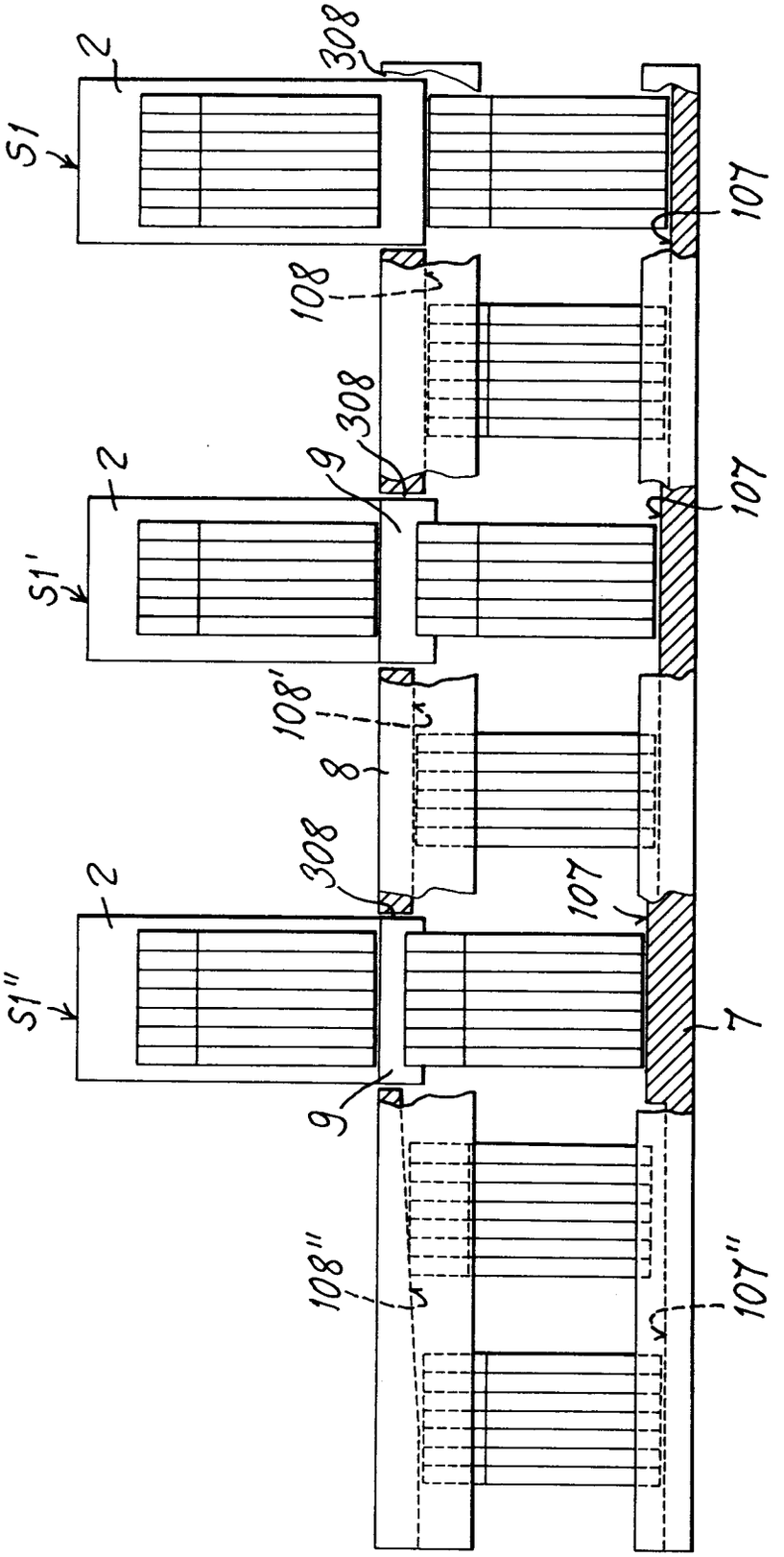

Fig.4

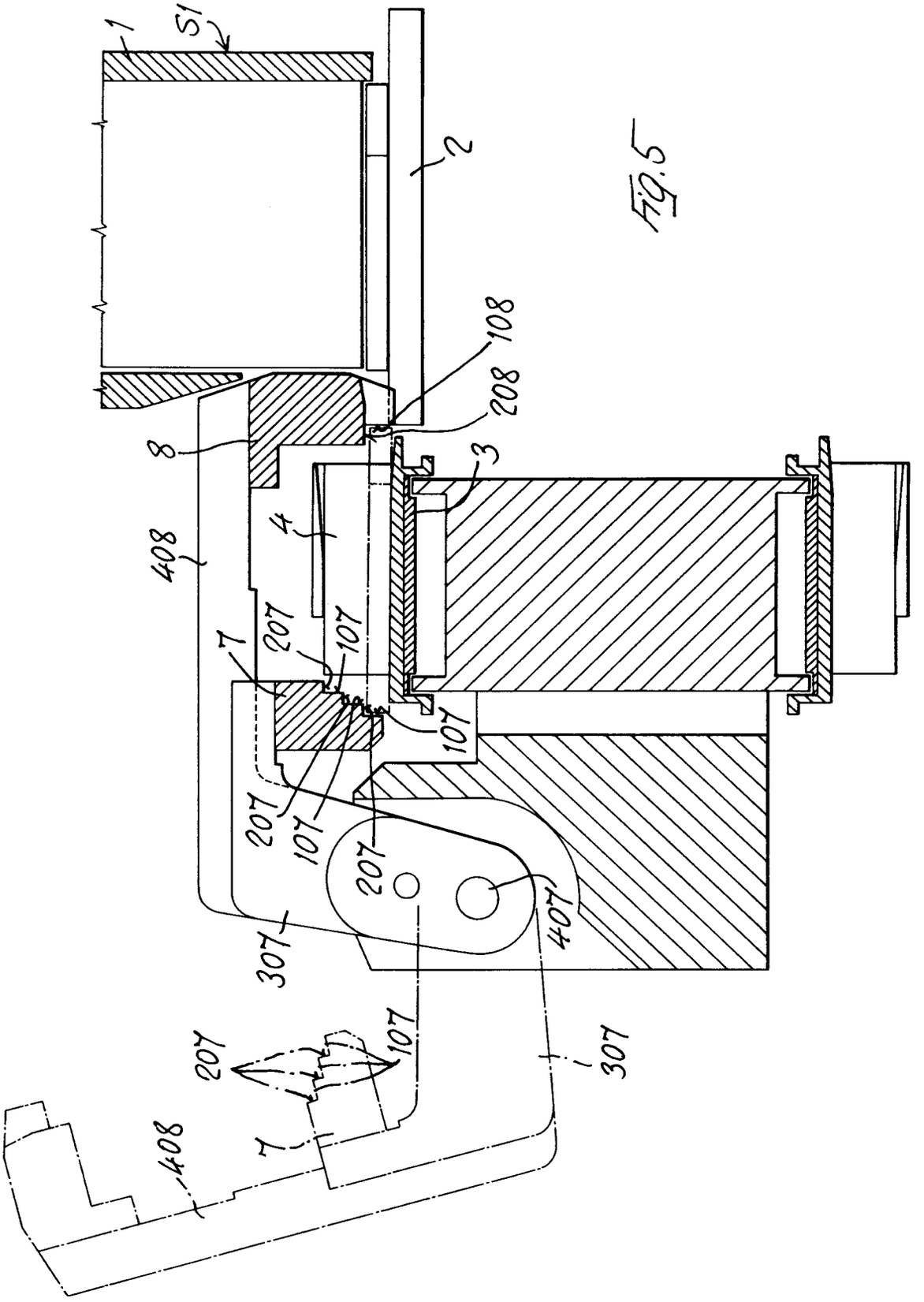

Fig.5

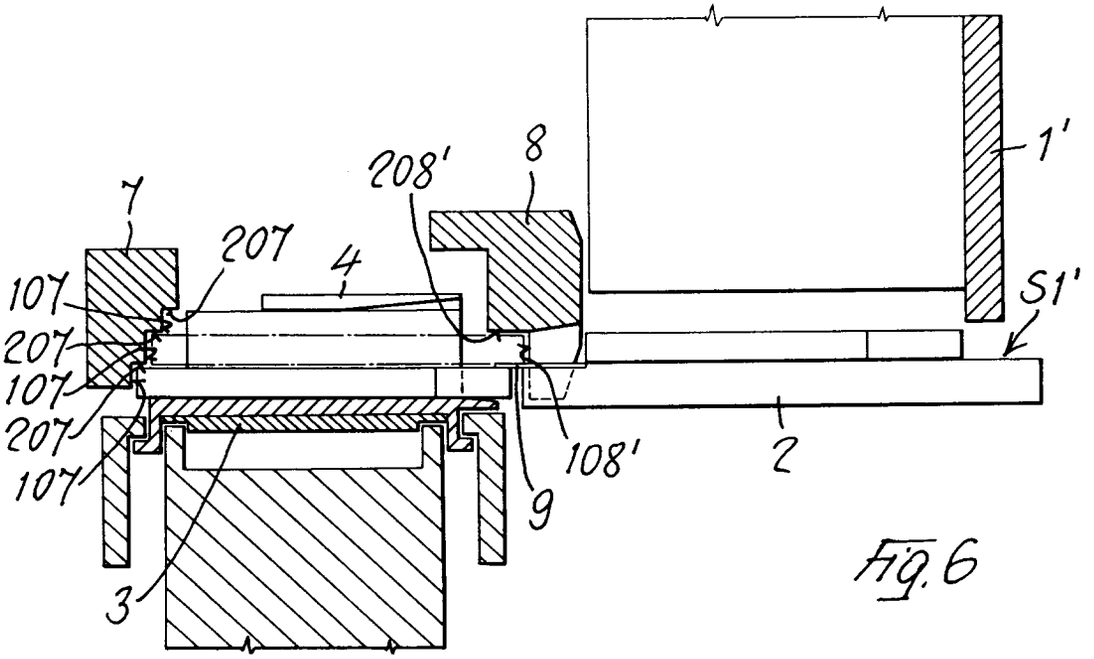
1'
8
208'
7
207
4
S1'
107
207
107
207
107
108'
2
9
3

Fig. 6

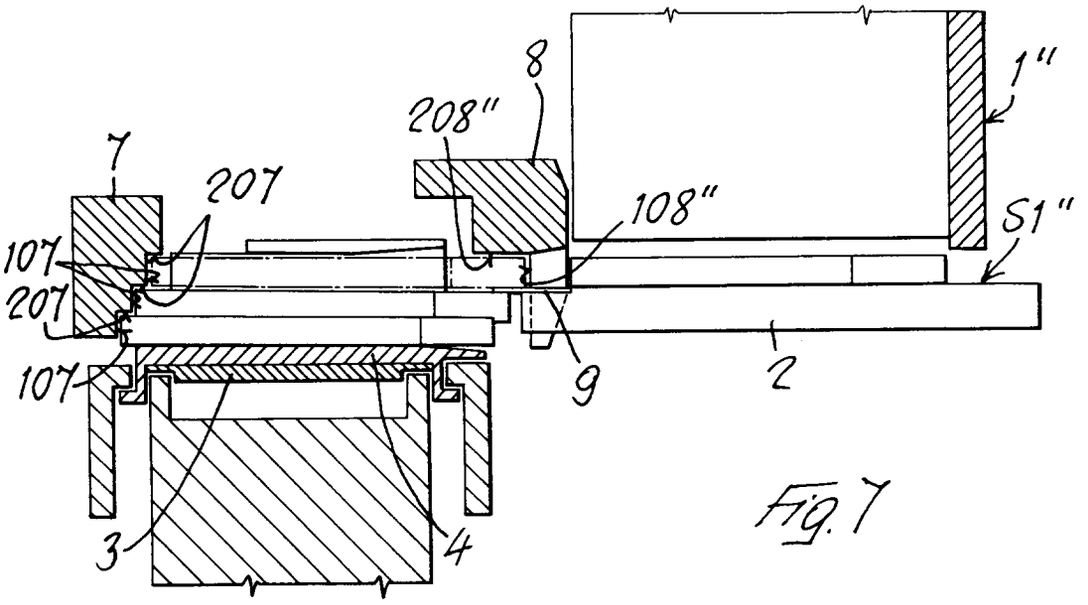
1"
8
208"
7
207
108"
S1"
107
207
107
9
2
3
4

Fig. 7

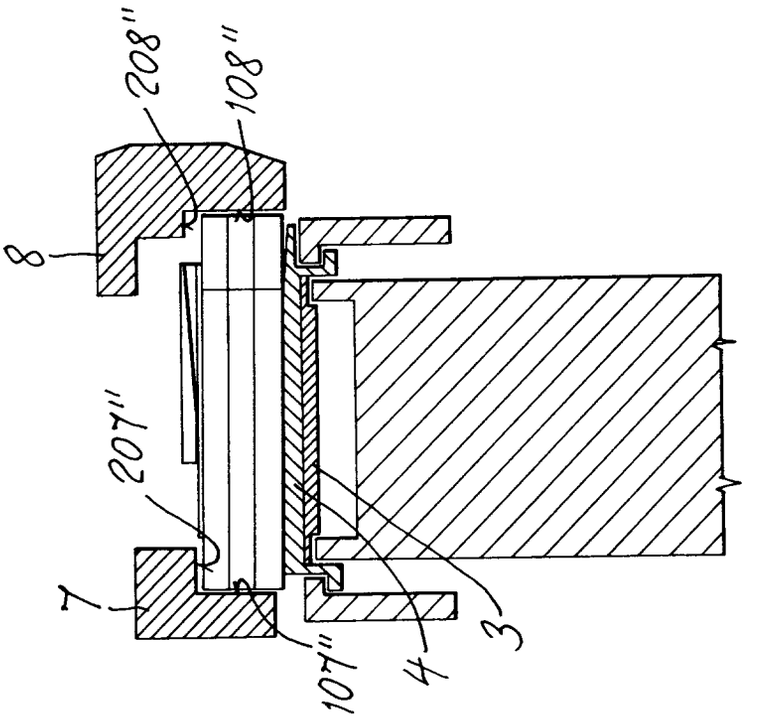

Fig. 9

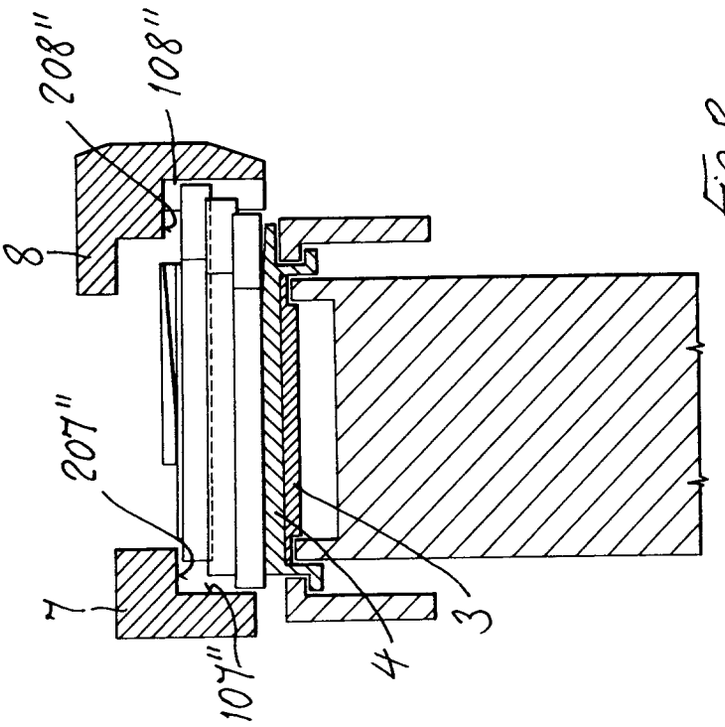

Fig. 8

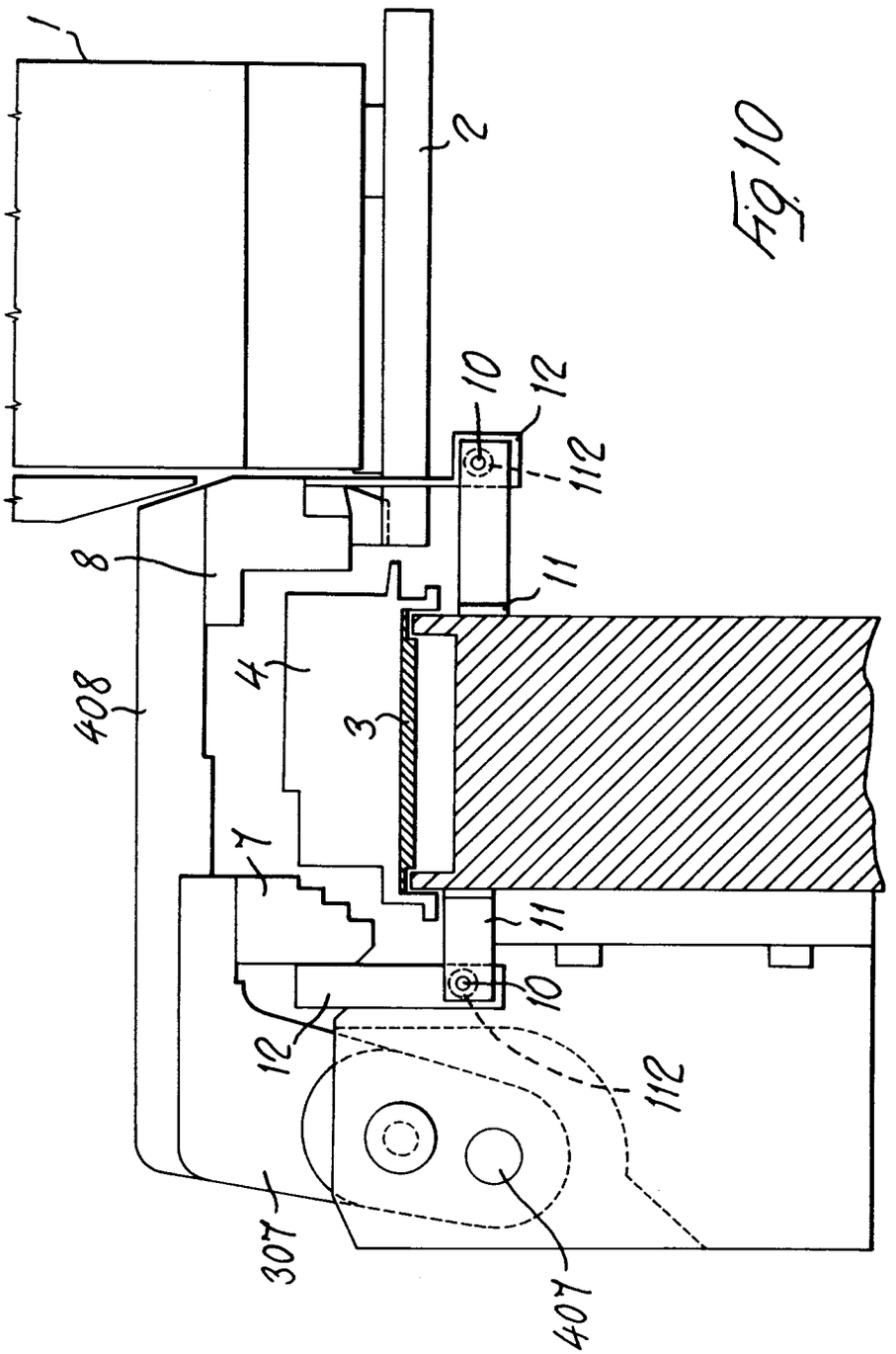

Fig 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 5150

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.6)
X A	GB-A-2 120 993 (ERDMANN) * the whole document * ---	1-5 6	B65B19/10
A	GB-A-2 160 514 (G.D.) * page 2, line 111 - line 117; figure 6 * -----	6	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 July 1995	Claeys, H

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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P : intermediate document

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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