

[54] APPARATUS FOR AUTOMATICALLY FEEDING CIGARETTES INTO A HOPPER OF A CIGARETTE PACKING MACHINE

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[51] Int. Cl..... B65g 59/02

[58] Field of Search 214/302, 303, 307, 312, 214/313, 314, 315

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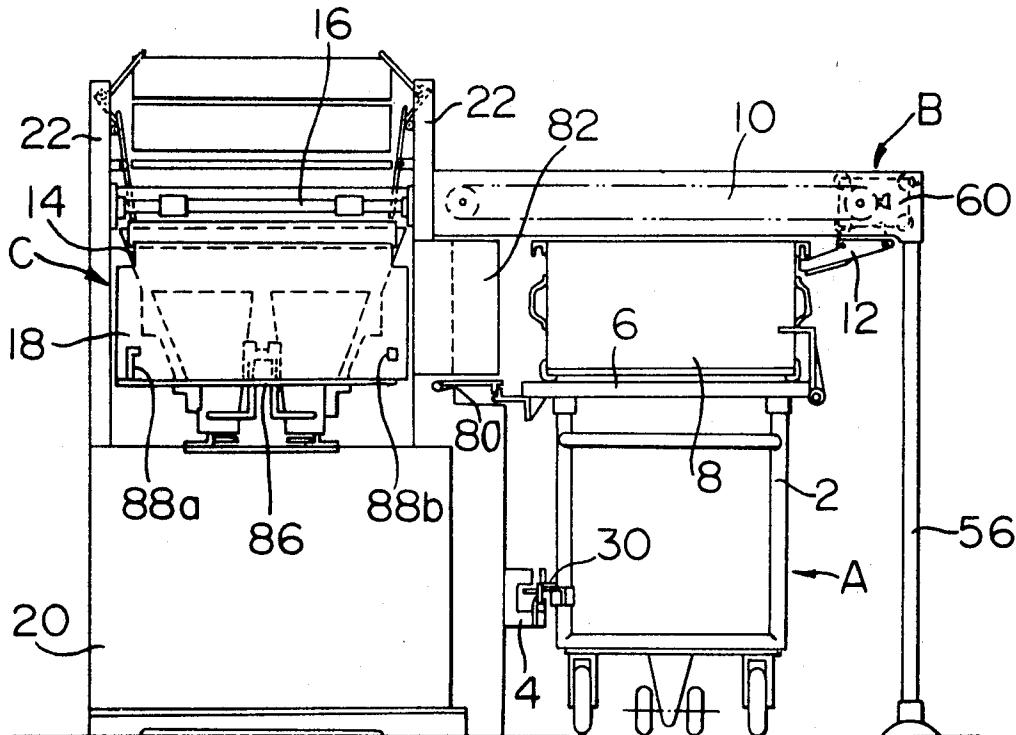
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Attorney, Agent, or Firm—Sherman & Shalloway

[57] ABSTRACT

An apparatus for automatically feeding cigarettes into a hopper of a cigarette packing machine from a cigarette tray, which comprises a cigarette tray feeding means, a cigarette tray transferring and withdrawing means, and cigarette tray inverting means. The cigarette tray feeding means feeds cigarette trays alongside said cigarette tray inverting means intermittently. The cigarette tray transferring and withdrawing means transfers the cigarette trays fed by the cigarette tray feeding means to the cigarette tray inverting means and withdraws them from the cigarette tray inverting means and transfers them to the cigarette tray feeding means. The cigarette tray inverting means inverts the cigarette trays transferred by the cigarette tray transferring and withdrawing means and feeds the cigarette in the tray into a hopper.

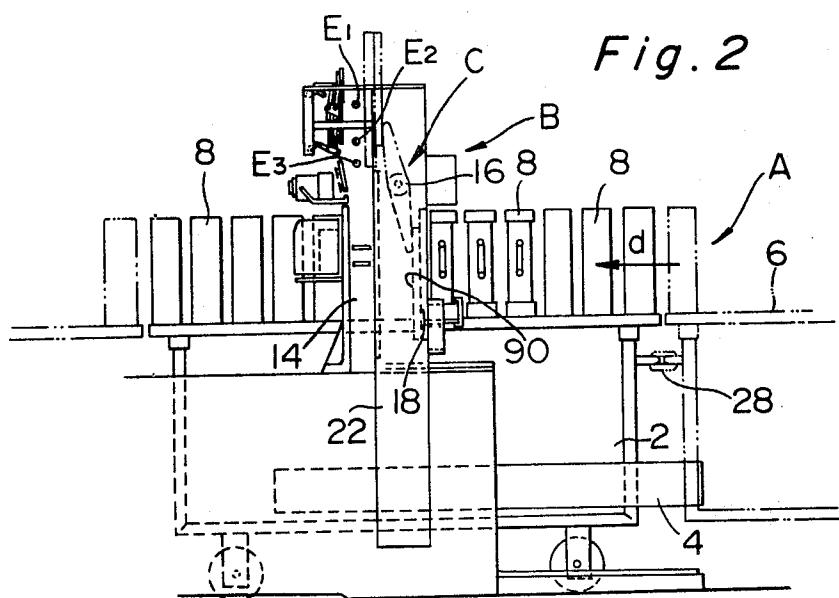
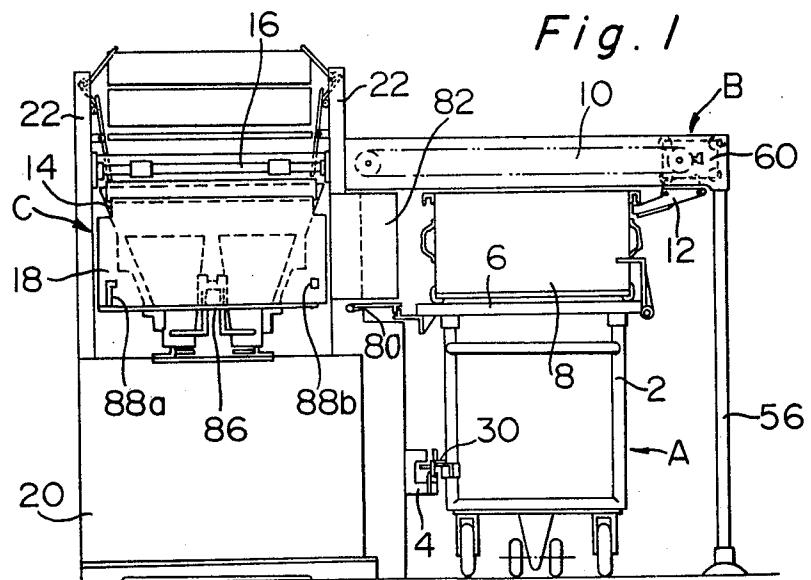
9 Claims, 17 Drawing Figures



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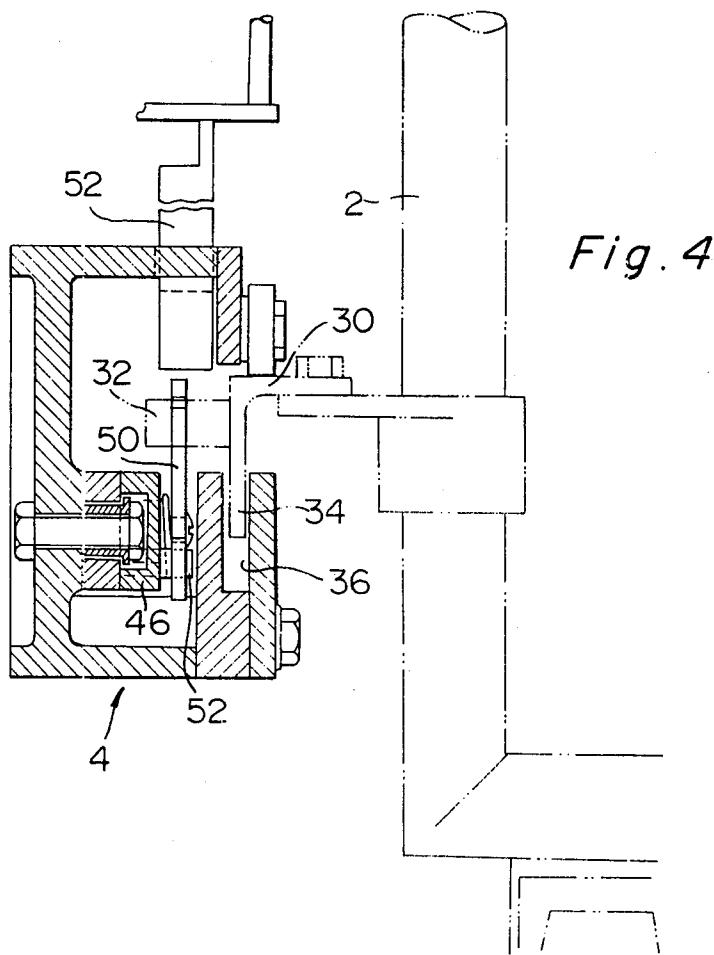
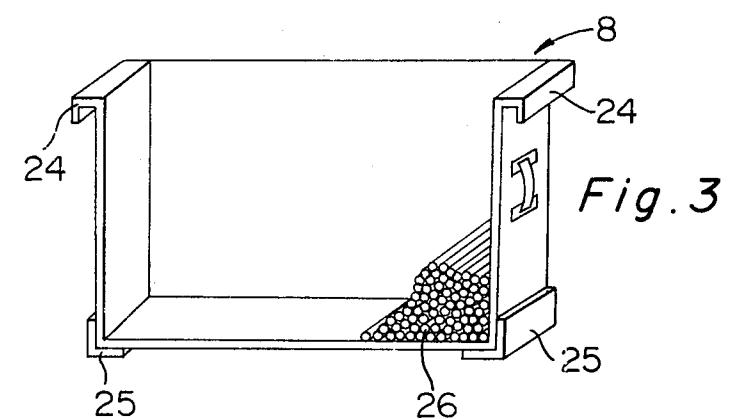
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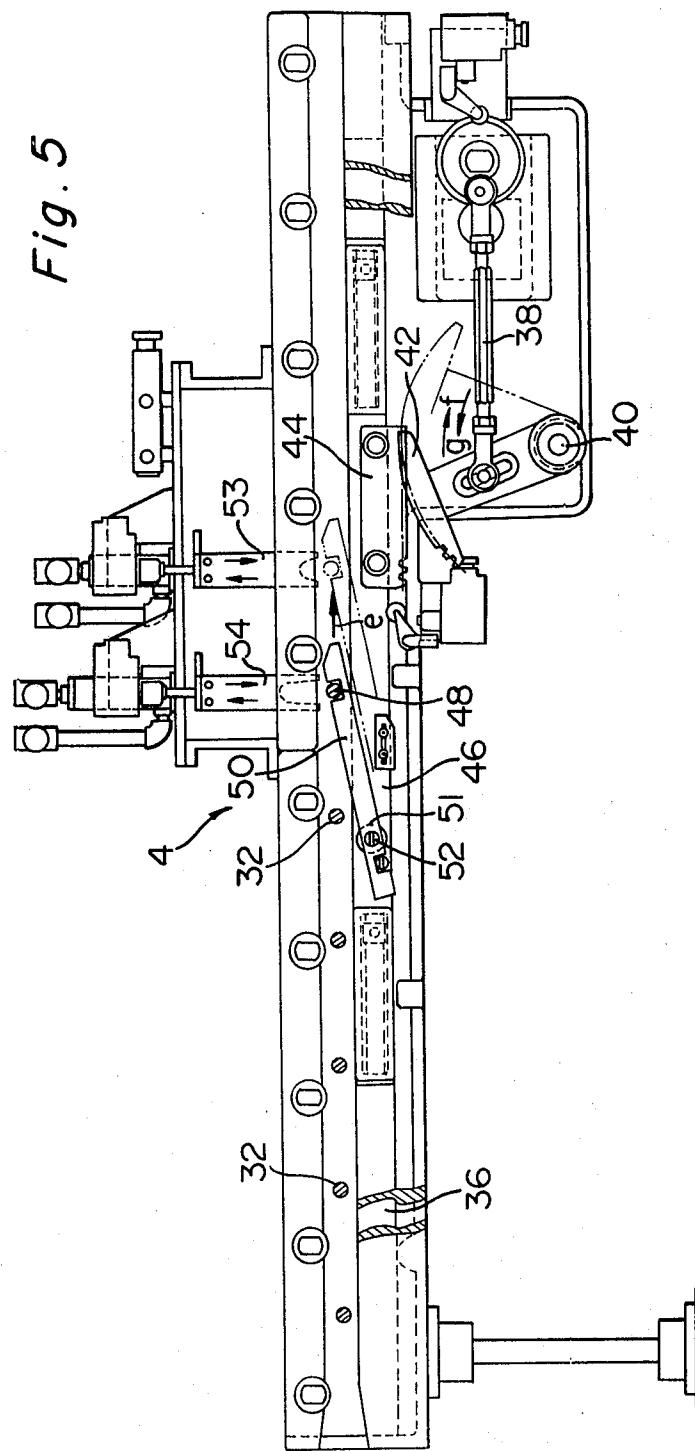


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Fig. 5



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Fig. 6

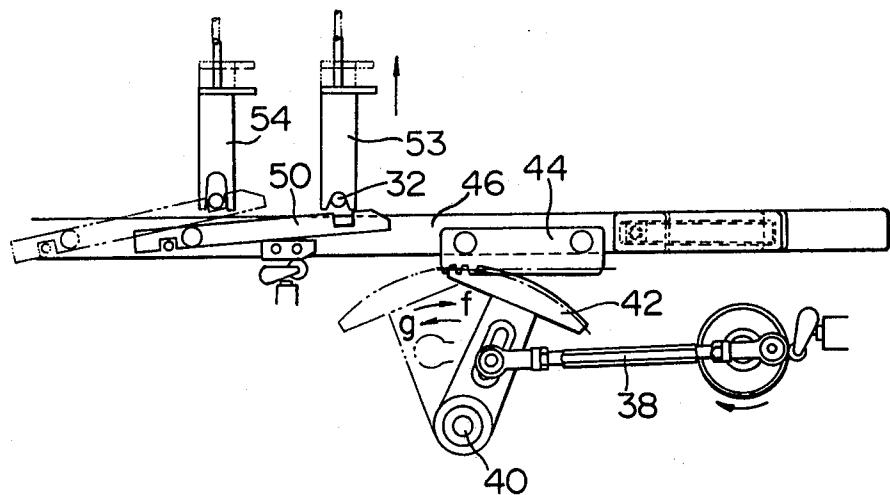


Fig. 7

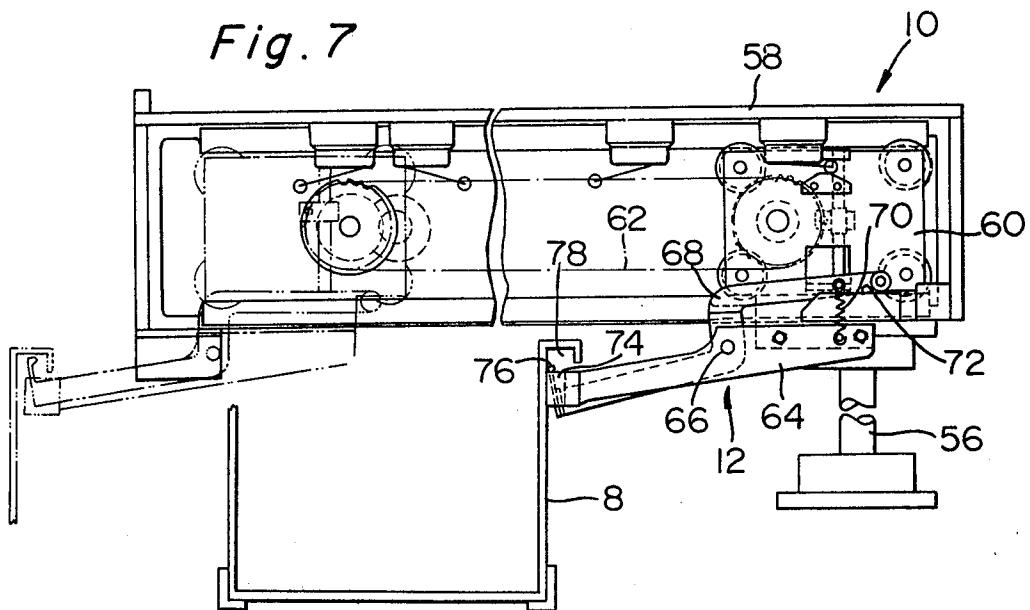


Fig. 8

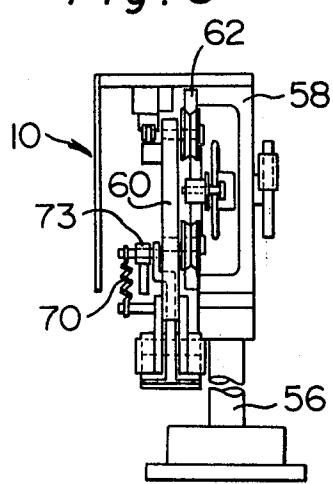


Fig. 9

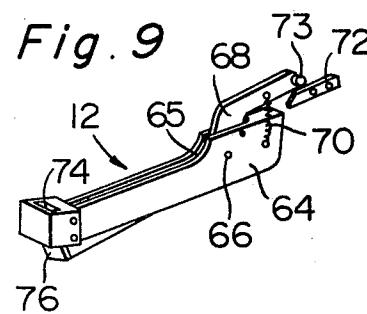
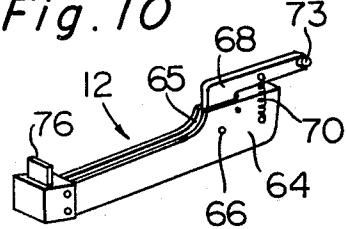


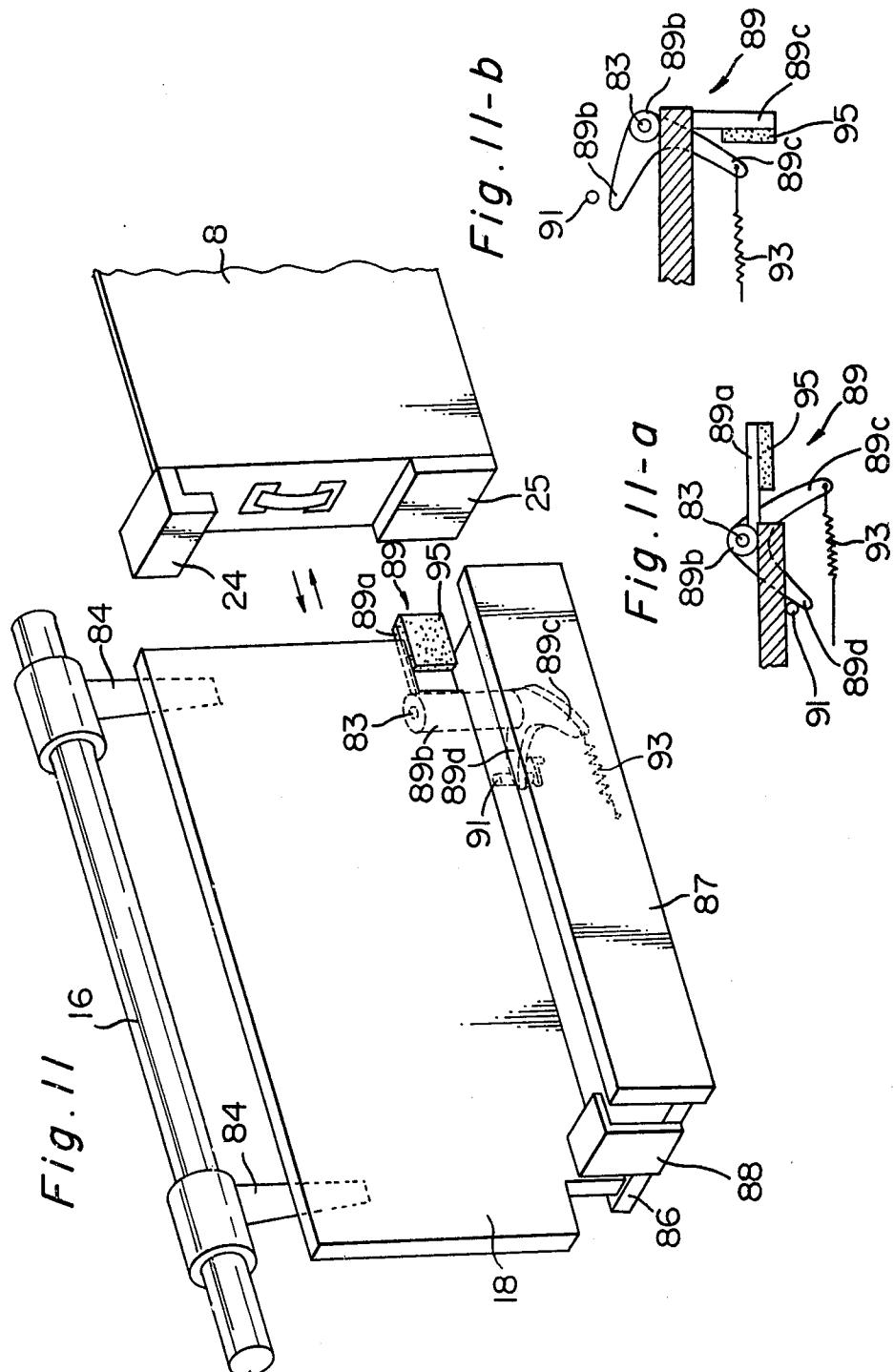
Fig. 10

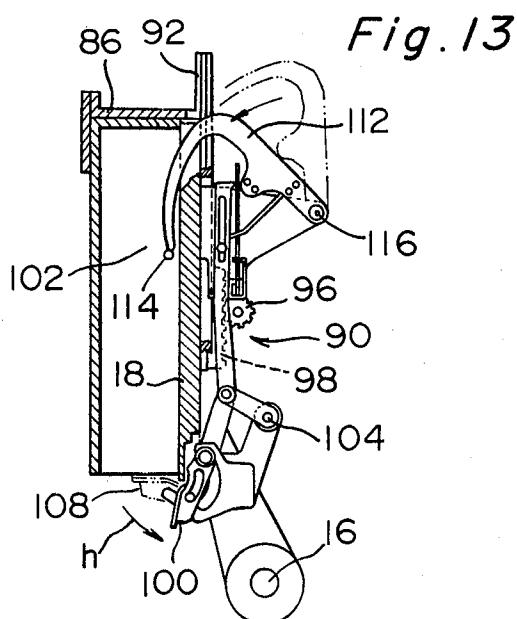
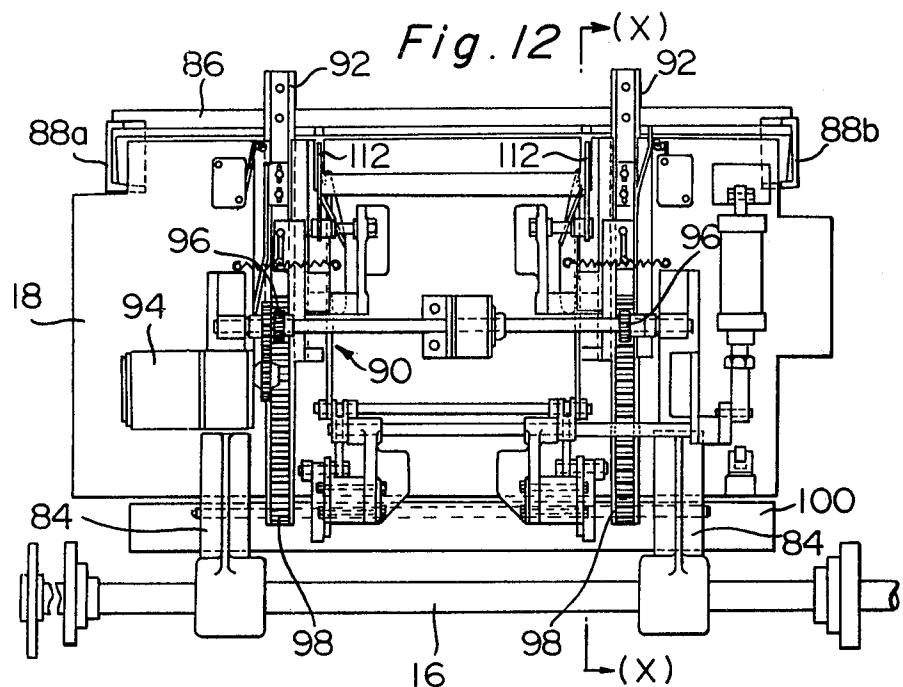


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Fig. 14

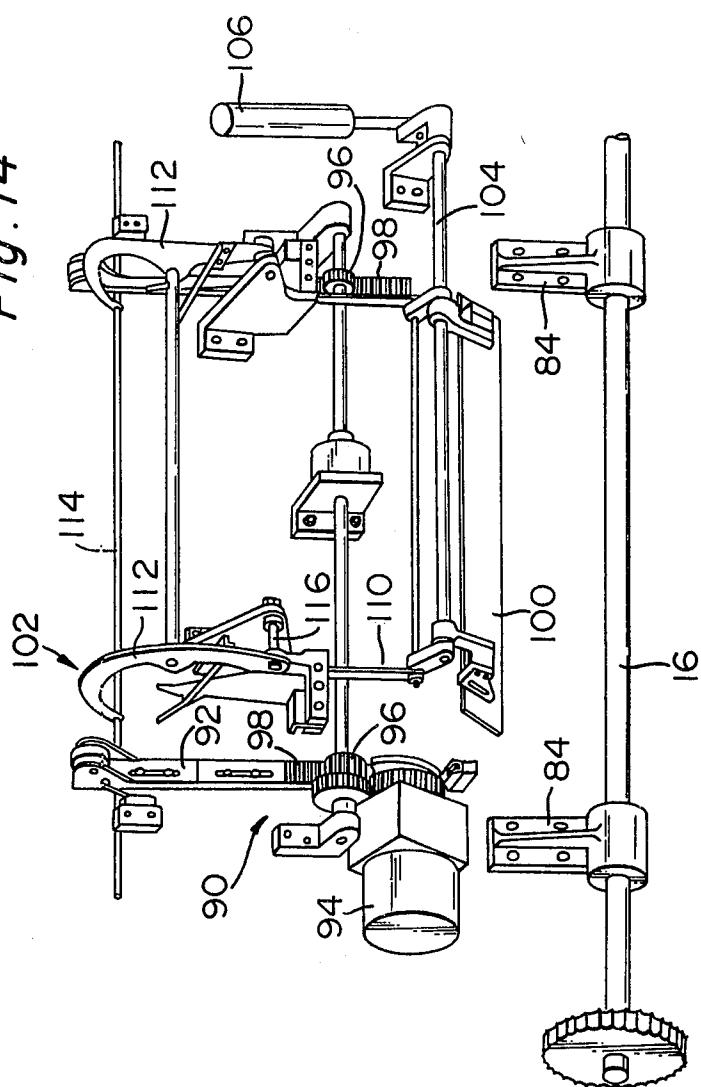
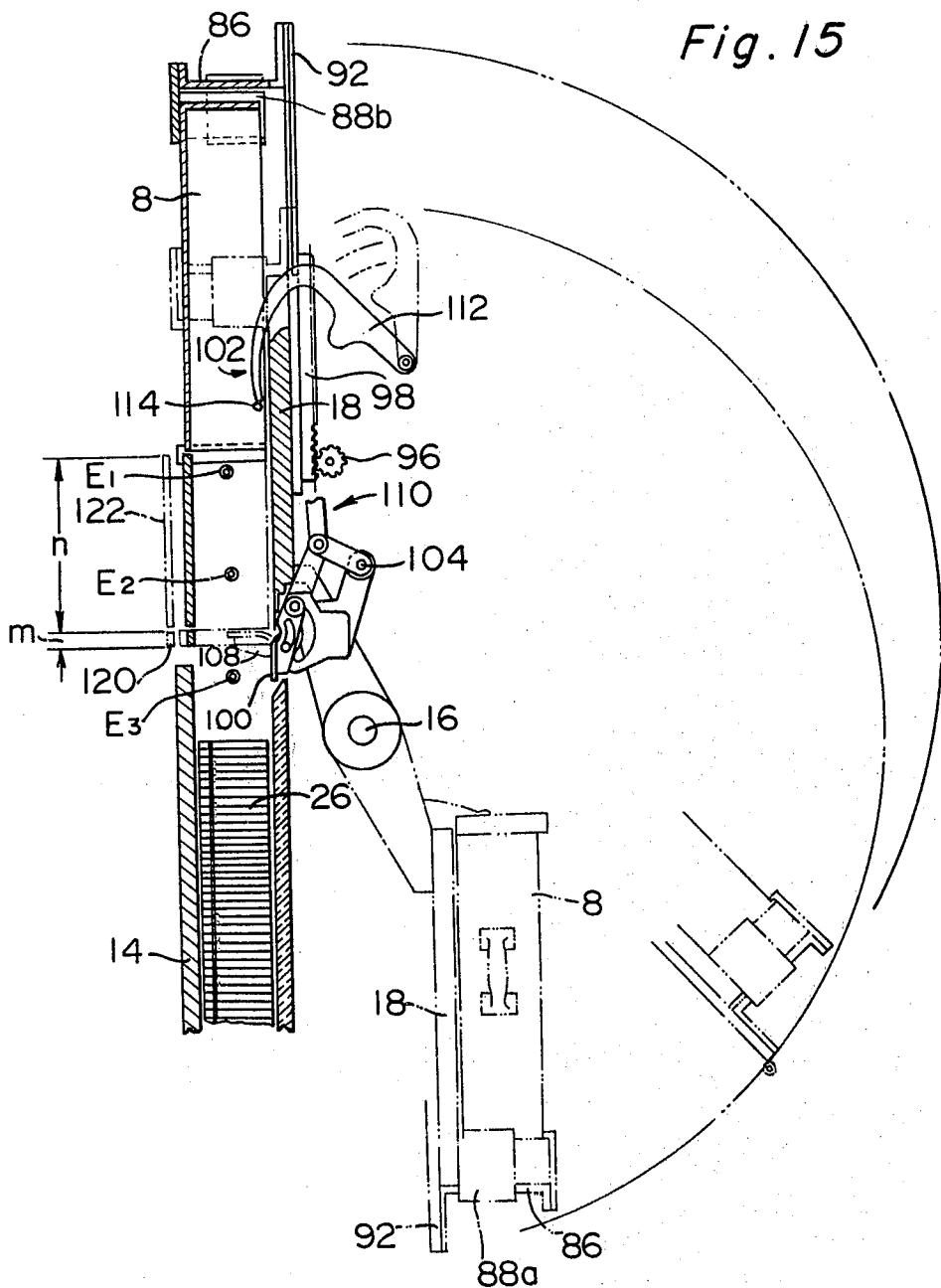


Fig. 15



APPARATUS FOR AUTOMATICALLY FEEDING CIGARETTES INTO A HOPPER OF A CIGARETTE PACKING MACHINE

This invention relates to an apparatus for automatically feeding cigarettes into a hopper of a cigarette packing machine, and more specifically, to an apparatus for automatically feeding cigarettes filled in a cigarette tray successively into a hopper of a cigarette packing machine.

Manually operable cigarette tray-inclining devices or semi-automatic cigarette tray-inclining devices have previously been used to supply cigarettes to a hopper of the packing machine. These devices require operators for supplying cigarettes, and it is difficult to increase the working efficiency of the packing machine by maintaining the amount of the cigarettes within the hopper always constant.

In recent years, apparatuses for automatically feeding cigarettes into the hoppers of cigarette packing machines have been worked out, but have not proved entirely satisfactory because of inability to reduce the number of personnel in the packing process or increase the efficiency of operation. Furthermore, these apparatuses are of complicated structure, which in turn causes a high cost of production.

Accordingly, an object of this invention is to provide an apparatus for feeding cigarettes automatically into a hopper of a cigarette packing machine in a rapid and exact manner.

Another object of this invention is to provide an apparatus for automatically feeding cigarettes filled in a tray into a hopper of a cigarette packing machine, which is of a relatively simple structure and can be operated very rapidly and assuredly with high efficiency.

Still another object of this invention is to provide an apparatus for automatically feeding cigarettes into a hopper of a cigarette packing machine, which further includes means for preventing the random arrangement or popping-up of cigarettes during feeding.

The above objects of this invention can be achieved in accordance with the present invention by an apparatus for automatically feeding cigarettes into a hopper of a cigarette packing machine from a cigarette tray, which comprises a cigarette tray feeding means, a cigarette tray transferring and withdrawing means, and a cigarette tray inverting means, wherein said cigarette tray feeding means is disposed alongside said cigarette tray inverting means and carries cigarette trays at predetermined intervals and feeding them intermittently; said cigarette tray transferring and withdrawing means is disposed above said tray feeding means and reciprocates in a direction at right angles to the direction of the intermittent feeding of said tray feeding means for transferring cigarette trays from said tray feeding means to said tray inverting means and withdrawing them from said tray inverting means and transferring them to said tray feeding means, when said cigarette tray feeding means is at halt; and said cigarette tray reversing means, while holding the cigarette trays, swings between the upright position of said tray transferring and withdrawing means at which position the cigarette trays are transferred and withdrawn and its upside-down position at which the cigarettes in the trays are fed into a hopper.

Other objects of this invention along with its advantages will become clear from the following description

given with reference to the accompanying drawings showing one embodiment of this invention, in which drawings:

FIG. 1 is a front elevation of an automatic cigarette feeding apparatus in accordance with this invention;

FIG. 2 is a side elevation of the apparatus shown in FIG. 1;

FIG. 3 is a perspective view of a cigarette tray for use in the automatic cigarette feeding apparatus of this invention;

FIG. 4 is an enlarged sectional view showing an intermittent feeding mechanism of the apparatus shown in FIG. 1;

FIGS. 5 and 6 are partially-broken-away enlarged side elevations showing the intermittent feeding mechanism same as in FIG. 4;

FIG. 7 is an enlarged partial front elevation showing a cigarette tray transferring and withdrawing means of the apparatus of FIG. 1;

FIG. 8 is a sectional view of the cigarette tray transferring and withdrawing means shown in FIG. 7;

FIGS. 9 and 10 are perspective views of the arms of the cigarette tray transferring and withdrawing means shown in FIG. 7;

FIG. 11 is an enlarged perspective view of a cigarette tray inverting means of the apparatus shown in FIG. 1;

FIGS. 11-a and 11-b are views showing the details of a cigarette tray holding member provided in a inverting plate at its open and held positions respectively;

FIG. 12 is a front elevation on an enlarged scale of a part of the cigarette tray inverting means in its upside-down position;

FIG. 13 is a sectional view taken along the line (x) —(x) of FIG. 12;

FIG. 14 is a perspective view showing the relation among a lift mechanism, a disturbance preventing means, a cover plate, and other members fitted to the reversing plate; and

FIG. 15 is an enlarged partial sectional view showing the swinging and vertical movement of the cigarette tray inverting means.

Referring to FIGS. 1 and 2, the automatic cigarette feeding apparatus of this invention includes a cigarette tray feeding means A, a cigarette tray transferring and withdrawing means B and a cigarette tray inverting means C.

The tray feeding means A includes a plurality of hand-pushable tray transporting vehicles 2 connected to each other in the longitudinal direction, and an intermittently feeding mechanism 4 for moving said tray transporting vehicles 2 intermittently in the longitudinal direction. Cigarette trays 8 arranged at predetermined intervals on upper surfaces 6 of the vehicles 2 are delivered intermittently in the longitudinal direction (the direction of arrow d of FIG. 2) of the vehicles 2. The feeding mechanism 4 will be described in greater detail below with reference to FIGS. 4 and 6.

The cigarette tray transferring and withdrawing means B includes a transferring and withdrawing mechanism 10 disposed alongside the cigarette tray inverting means C above the passageway of the tray transporting vehicles 2, and an arm 12 which reciprocates in a direction at right angles to the direction of movement of the vehicles 2 by means of this transferring and withdrawing mechanism 10. This means B transfers a tray 8 containing cigarettes which has been delivered to a position adjacent to the cigarette tray inverting means C by

the feeding means A, to the cigarette tray inverting means C, and transports the empty tray 8, from which the cigarettes have been fed into a hopper 14 of a cigarette packing machine (not shown), from the tray inverting means to the cigarette tray feeding means A. This means B will be described in greater detail later on.

The cigarette tray inverting means C includes a inverting plate 18 connected to a shaft 16 for swinging movement. The shaft 16 is secured rotatably to an upright beam 22 fixed to a base 20 by a suitable means such as welding or bolting. The inverting plate 18, as a result of the rotation of the shaft 16, swings between its upright position (shown by a solid line in FIG. 1 and a broken line in FIG. 2) at which it receives the cigarette tray 8 from the cigarette tray transferring and withdrawing means B and the upside-down position [the position shown by a short-and-long-dash line (imaginary line) in FIG. 2] at which the cigarettes in the tray 8 are fed into the hopper 14.

Before describing the details of the constituent parts of the automatic cigarette feeding apparatus of this invention, the cigarette tray 8 shown in FIG. 3 will be described. Generally, the cigarette tray 8 used for the cigarette packing process is a rectangular box open at the upper and front sides. Projections 24 are provided at the top side ends of the casing, and sectionally L-shaped members 25 are secured to the bottom side ends of the casing. Cigarettes 26 are filled in the space of the tray 8, as shown.

Now, the cigarette tray feeding means A will be described in detail by reference to FIGS. 1, 2, 4, 5 and 6. The tray transporting vehicles 2 can be connected to each other by joints 28 (see FIG. 2) provided at the front and rear ends. To one side of each vehicle 2 is fitted a beam 30 (see FIGS. 1 and 6) having an inverted L-shaped cross section and extending longitudinally of the tray transporting vehicle 2. Feed pins 32 are provided on the beam 30 at equal intervals in the longitudinal direction of the tray transporting vehicles 2. A portion 34 extending downwardly in a perpendicular direction to the beam 30 is inserted in a guide groove 36 of the intermittently feeding mechanism 4 provided on the base 20, and is guided by it. As shown in FIGS. 5 and 6, the intermittently feeding mechanism 4 includes a toothed member 42 which swings by a certain angle around a shaft 40 by a rod 38 connected to a suitable power source, and a rack 44 which reciprocates by a predetermined distance by the swinging of the toothed member 42. The rack 44 is fixed to a feed plate 46 which is slidably provided in the intermittently feeding mechanism 4 in the longitudinal direction. To the plate 46 is secured a rod 50 having a depression 48 for engagement with the feed pin 32 of the tray transporting vehicle 2 so that the rod 50 will swing about a shaft 52. The rod 50 is urged counterclockwise by a spring 51 or the like, and upon engagement with the feed pins 32 of the tray transportation vehicles 2, moves the vehicles 2 to the position shown by the imaginary line as a result of the swinging of the member 40 in the direction of arrow f. Above the feed pin 32 at this position, a member 53 which can reciprocate by a suitable means such as a pneumatic cylinder is provided. This member 53 falls down to the position shown in FIG. 6 when the rod 50 has reached the position shown by the imaginary line in FIG. 5 (that is, the position shown by the solid line in FIG. 6), and by swinging the rod downwardly,

the engagement between the rod 50 and the feed pin 32 is released. Then, by the turning of the member 42 in the direction of arrow g, the rod 50 returns to the original position, and comes into engagement with a next feed pin 32. In this returning process, the upper edge of the rod 50 is under continuous contact with the next feed pin 32 by the action of the spring 51, and when it returns to the original position, comes into engagement with the next feed pin 32. By the time the rod 50 returns to the original position, the member 53 rises and returns to the original position. In FIGS. 5 and 6, a member 54 of the same structure is provided at a position spaced rearwardly from the member 53 by a distance corresponding to the feed pin. This is for the purpose of correctly positioning the foremost feed pin of the rearwardly located tray transporting vehicle with respect to the last feed pin of the forwardly located tray transporting vehicle, when there is some loosening in the joint 28 for the vehicles 2. The distance between the two adjoining feed pins 32 corresponds to the distance between the cigarette trays 8 spaced on the tray transporting vehicles 2.

As described above, it will be apparent that the cigarette trays 8 are intermittently fed by certain distances 25 by the intermittently feeding mechanism 4. In the embodiment shown in the drawings, the cigarette tray feeding means consisting of the tray transporting vehicles 2 and the intermittently feeding mechanism 4 is used, but it is also possible to feed the cigarette trays 30 8 intermittently by such means as a chain or conveyor. The use of hand-pushable tray transporting vehicles is preferred because an operation of transferring and exchanging the cigarette trays 8 can be omitted.

The cigarette tray transferring and withdrawing means C will be described in greater detail by referring to FIGS. 1, 7, 8 and 9. A tray transferring and withdrawing mechanism 10 has a frame 58 secured to an upright beam 22 and a supporting post 56 above a passageway of the tray transporting vehicle 2 at a position 35 alongside the cigarette tray inverting means C. The frame 58 includes an endless chain 62 for reciprocating a moving plate 60 in a direction at right angles to the moving direction of the tray transporting vehicles 2. The arm 12 includes a first arm portion 64 secured to the lower end of the moving plate 60 for reciprocating movement therewith and a second arm portion 68 partly inserted in a central open part 65 of the first arm portion 64 and rotatably connected to the first arm portion at 40 66. The second arm portion is urged clockwise by a pulling spring 70 one end of which is connected to the first arm 64 and the other of which to the second arm 68. To the rear end of the second arm 68 is fixed a roller 73 which comes into contact with a guide surface 72 provided at the rear end of the frame 58. The forward end of the second arm 68 has a hook 76 adapted to project from an opening 74 at the forward end of the first arm 64. In the above construction, in the early stage of the forward movement of the moving plate 60 and the arm 12, the hook 76 of the second arm 45 68 is placed within the opening 74 at the forward end of the second arm 68 (see FIG. 9), and the arm 12 comes into collision with the side wall of the cigarette tray 8 to move it in the direction of the cigarette tray inverting means C. When the arm 12 has advanced over a certain distance, the hook 76 of the second arm 68 projects into a space 78 formed by the projections 50 24 of the cigarette tray 8 by the action of the spring 70

(see FIG. 10). Accordingly, when the arm 12 moves rearwardly, the hook 76 comes into engagement with the opening 74 to move the cigarette tray backwards. Immediately before the arm 12 has returned to the original position shown in FIG. 10, the hook 76 is again plunged in the opening 74 by the action of the roller 73 and the guide surface 72.

Referring to FIG. 1, the transfer and delivery of the cigarette tray 8 will be described briefly. When the moving plate 60 moves from right to left in FIG. 1, the arm 12 pushes the cigarette tray 8 filled with cigarettes towards the inverting plate 18 of the cigarette tray inverting device B. Furthermore, by the movement of the moving plate 60 from left to right, the cigarettes in the cigarette tray inverting device C are supplied to the hopper 14, and the empty cigarette tray is retracted from the inverting plate 18 towards the cigarette tray feeding device. As shown in FIG. 1, on the same plate as the upper surface of the tray vehicle 2, a guide bottom wall 80 and a guide side wall 82 are provided between the cigarette tray feeding device A and the inverting plate 18. These walls guide the movement of the cigarette tray between the cigarette tray feeding device A and the inverting plate 18.

In the embodiment illustrated in the drawings, an endless chain 62 is used to reciprocates the moving plates 60, but various known mechanisms can be used in its place to reciprocate the moving plate 60.

Referring to FIGS. 1, and 11 to 15, the cigarette tray reversing means C will be described. In FIG. 11, the cigarette tray 8 and the inverting plate 18 in the position of receiving the tray 8, that is, in the upright position, are shown. The inverting plate 18 is fixed to a shaft 16 by an arm 84 extending from the shaft 16, and by the rotation of the shaft 16, swings between the upright position and the upside-down position (see FIG. 12). The shaft 16 is adapted to be rotated by a suitable power source (not shown) such as an electric motor. A receiver stand 86 is provided at the lower end of the inverting plate 18 in its upright position in order to receive the cigarette tray 18. This receiver stand 86 is fixed to sliding beam 92 (see FIGS. 12 and 14) to move with respect to the inverting plate 18. This will be described in greater detail later on. To the forward end of the receiver stand 86, a plate 87 is fixed. Furthermore, to both sides of the receiver stand 86, support members 88 and 89 are provided for supporting the cigarette tray 8 by engagement with a member 25 of the tray 8. The support member 88 is fixed to the receiver stand 86, and the member 89 is swingably fixed to the back surface of the inverting plate 18.

Referring to FIGS. 11-a and 11-b, the member 89 will be described in detail. A shaft 83 is fixed to the back surface of the inverting plate 18 by a suitable means such as a bracket, and to the shaft 83 are swingably fixed a support member 89-a and a cylindrical member 89-b which are integral with each other. Two legs 89-c and 89-d are integrally formed at the lower end of the member 89-b, and a spring 93 is connected to the forward end of the leg 89-c. The other end of the spring 93 is connected to the undersurface of the receiver stand 86, for example, and this spring urges the members 89-a and 89-b clockwise. The forward end of the leg 89-d comes in contact with a stop pin 91 provided at the base, when the inverting plate 18 is in the upright position. In the above-described construction, the support member 89 is at the cigarette tray receiving and

releasing positions shown in FIG. 11-a when the inverting plate 18 is at the upright position. When the inverting plate begins to swing, it is at the supporting position shown in FIG. 11-b. In other words, when the inverting plate 18 is in the upright position, the forward end of the leg 89-d comes into contact with the stop pin 91 to retain the member 89-c at the receiving and releasing positions, and when the inverting plate 18 begins to swing, the engagement between the leg 89-d and the stop pin 91 is released and the member 89-a swings to the position shown in FIG. 11-b by the action of the spring 93, whereupon the front surface of the member 89-a contacts the side surface of the cigarette tray 8, and the lower surface of the member 89-a contacts the upper surface of the member 25 of the cigarette tray 8. When the inverting plate 18 returns to the upright position from the upside-down position, the leg 89-d is engaged with the stop pin 91, and the member 89-a returns to the receiving and releasing position. Preferably, the surface of the member 89-c with which the side surface of the cigarette tray comes into contact has fixed thereto an elastic buffer member 95.

When the cigarette tray 8 filled with cigarettes is pushed by the arm 12 and inserted in the receiver stand 86, the member 88 and 89 support the cigarette tray, and the cigarette tray 8 swings to the upside-down position with the turning of the inverting plate 18. The empty cigarette tray 8 after supplying the cigarettes into the hopper 14 returns to the original position by the inverse turning of the inverting plate 18, and by being pulled by the arm 12, is retracted towards the cigarette tray feeding device A. As previously mentioned, the member 89 returns to the receiving and releasing position.

As shown in FIGS. 12 to 14, a lift mechanism 90 for lifting the cigarette tray 8 supported by the receiver stand 86 is provided on the back surface of the inverting plate 18, that is, the surface opposite to the tray receiving side. The lift mechanism 90 includes a small-sized electric motor 94 fixed to the reversing plate 18, a pinion 96 connected to the output shaft of the motor 94, and a rack 98 engaged with the pinion 96. The rack 98 is fixed to the sliding beam 92 provided slidably on the inverting plate 18. As previously stated, the receiver stand 86 is fixed to the sliding beam 92. Accordingly, when the motor 94 rotates, the sliding beam 92 moves vertically, and hence the receiver stand 86 moves vertically with respect to the inverting plate 18. Since this receiver stand 86 supports the cigarette tray 8 by means of the support members 88a and 88b, the cigarette tray 8 also moves vertically with respect to the inverting plate 18.

The back surface of the inverting plate 18 includes a cover plate 100 for covering the upper opening of the cigarette tray 8 and means 102 inserted in the cigarette tray 8 (see FIG. 13) in the upside-down position for preventing the disorder of the cigarettes. Usually, the cover plate 100 covers the upper opening of the cigarette tray 8 partially, but when the cigarettes are fed from the upside-down cigarette tray 8 into the hopper, it swings in the direction shown by arrow h in FIG. 13. At the time of swinging, the swinging shaft 104 rises somewhat by the cylinder 106. Accordingly, the cover plate draws a locus shown by 108.

The means 102 for preventing the disorder of cigarettes includes a pair of sickle-shaped members 112 adapted to be turned around the shaft 116 and inserted

in the cigarette tray 8, and an elongated rod 114 for holding the cigarettes which is fixed to the forward end of the member 112. The member 112 is urged generally in the counterclockwise direction by such means as a spring. The member 112 is connected to the cover plate 100 by a linking mechanism 110, and the two are operated interlockingly. As soon as the cover plate 100 turns and opens, the disorder preventing means 102 is inserted in the cigarette tray 8. The details of this portion are described in Japanese Utility Model Publication No. 12560/1972.

As shown in FIG. 15, an electrical means is provided above the hopper 14 for detecting the level of cigarette 26 fed into the hopper 14 and thus controlling the turning of the inverting plate 18 and the vertical movement of the sliding beam 92 (hence, the cigarette tray 8). In the embodiment shown in the drawings, the electrically detecting means comprises three photoelectric tubes E₁, E₂ and E₃ spaced at predetermined intervals above the hopper 14.

The turning of the inverting plate 18 and the vertical movement of the cigarette tray 8 are controlled as follows: When the level of cigarette 26 within the hopper is at the position of the photoelectric tube E₂, the inverting plate 18 having the cigarette tray 8 filled with cigarettes begins to turn from the upright position to the upside-down position. Of course, at this time, the cover plate 100 partially closes the upper opening of the cigarette tray 8, and the disorder preventing means 102 has not yet been inserted in the tray 8. When the inverting plate 18 reaches the upside-down position and comes to a halt, the sliding beam 92 rises by the distance m (for example, 10 mm) shown in FIG. 15. Accordingly, the cigarette tray 8 is moved upwardly by the distance m . With the upward movement of the tray 8 by the distance m , the guide plate 120 provided above the hopper 14 moves horizontally from the position shown by the imaginary line in FIG. 15 to the position shown by the solid line, and covers the front surfaces of cigarettes 26 exposed as a result of the upward movement of the tray 8. By the upward movement of the tray 8, a space is formed between the bottom wall of the tray 8 and the upper surfaces of the cigarettes within the tray 8 in which the means 102 can be inserted. When the level of cigarettes within the hopper 14 reaches the position of the photoelectric tube E₃, the cover plate 100 turns and opens, and the cigarettes in the tray 8 are fed into the hopper 14. At the same time, the means 102 for preventing the disorder of the cigarettes is inserted in the tray 8 to hold the uppermost surface of the cigarettes and thus prevent the popping of the cigarettes caused by falling. Then, the cigarette tray 8 further rises by the distance n (for example, 170 mm) as shown in FIG. 15. With this rise in the cigarette tray 8, the guide plate 122 provided above the guide plate 120 moves horizontally from the position shown by the imaginary line in FIG. 15 to the position shown by the solid line, and with the rise in the tray 8, covers the front surfaces of the exposed cigarettes 26. Thereafter, when the level of the cigarettes fed into the hopper 14 is at the position of the photoelectric tube E₁, the inverting plate 18 begins to swing from the upside-down position to the upright position. Consequently, the cigarettes are closed with plate 122 at their front and both sides are closed with guide plates as shown in FIG. 1. Before the inverting plate 18 reaches the upright position, the sliding beam 92 and the empty tray

8 descend by the distance ($m + n$) and return to the original position. The guide plates 120 and 122 return to the original positions shown by the imaginary line when the level of the cigarettes passes the lower ends of these guide plates. Raising of the tray 8 by a predetermined distance after the cigarettes begin to be fed into the hopper 14 is for the purpose of rapidly feeding the cigarettes in the tray 8 and performing a next step of the inverting plate 18 before the amount of the cigarettes in the hopper 14 becomes very small.

The operation of the apparatus of this invention is believed to be clear from the above description, but will be summarized below.

The cigarette tray 8 filled with cigarettes which has been transferred to the position alongside the tray inverting means C by the tray feeding means A moves towards the inverting plate 18 by being pushed by the arm 12 of the tray transferring and delivering means B, and is received by the inverting plate 18. The inverting plate 18 which has received the tray 8 swings from the upright position to the upside-down position, and further, as detailedly described above, feeds the cigarettes within the tray 8 into the hopper 14. When the cigarettes within the tray 8 have been fed into the hopper 14, the inverting plate 18 swings from the upside-down position together with the empty tray 8 to the upright position. Next, the arm 12 of the tray transferring and delivering means B delivers the empty cigarette tray 8 from the inverting plate 18 towards the tray feeding means A. When the empty tray 8 has been returned to the tray delivering means A, the intermittently feeding mechanism 4 of the tray feeding means A pushes the tray transportation vehicle 2 by one pitch, and accordingly, pushes the tray 8 forwardly by one pitch. Sequence control means for the individual components of the apparatus of this invention have not been described in detail, but it will be obvious to those skilled in the art that sequence control can be performed as desired by using suitable electrical or mechanical control means.

While the present invention has been described in detail by reference to the accompanying drawings, it should be understood that the present invention is not limited to the embodiment described in the drawings, but various changes and modifications can be made without departing from the spirit and scope of the present invention.

What is claimed is:

1. An apparatus for automatically feeding cigarettes into a hopper of a cigarette packing machine from a cigarette tray, which comprises a cigarette tray feeding means, a cigarette tray transferring and withdrawing means, and a cigarette tray inverting means, wherein said cigarette tray feeding means is disposed alongside said cigarette tray inverting means and carries cigarette trays at predetermined intervals and feeds them intermittently; said cigarette tray transferring and withdrawing means is disposed above said tray feeding means and reciprocates in a direction at right angles to the direction of the intermittent feeding of said tray feeding means for transferring cigarette trays from said tray feeding means to said tray inverting means and withdrawing them from said tray inverting means and transferring them to said tray feeding means, when said cigarette tray inverting means is at halt; and said cigarette tray inverting means, while holding the cigarette trays, swings between the upright position of said tray, the upright position being defined as the position in which the

cigarette trays are transferred and withdrawn and an upside-down position in which the cigarettes in the trays are fed into a hopper, said cigarette tray inverting means includes a inverting plate capable of swinging between the upright position and the upside-down position, a receiver stand having a cigarette tray supporting member and connected to said inverting plate and being vertically movable relative thereto, and a lift means for lifting said receiver stand when the inverting plate is in the upside-down position and causing it to descend when the inverting plate is on the way from the upside-down position to the upright position.

2. The apparatus of claim 1 which further includes at least one electrical detecting means for detecting the level of the cigarettes within the hopper in order to control the swinging of the inverting plate and the vertical movement of the receiver stand according to the level of the cigarettes within the hopper.

3. The apparatus of claim 1 which further includes a cover plate swingably connected to said inverting plate for partly covering the upper opening of the cigarette tray supported on the receiver stand and means for preventing the disorder of cigarettes which are in the tray when said cover plate is opened for feeding the cigarettes into the hopper at the time of the upside-down position of the inverting plate and holds the uppermost surfaces of the cigarettes within the trays to prevent the disorder of the cigarettes caused by falling.

4. The apparatus of claim 3 wherein said lift mechanism lifts said receiver stand by a predetermined distance when the inverting plate is at the upside-down position, and after this lifting, the cover plate is opened and the cigarette disorder preventing means is inserted in the tray, and then the lift mechanism further lifts said receiver stand by a predetermined distance.

5. The apparatus of claim 4 which further includes at least one electrical detecting means for detecting the level of the cigarettes within hopper in order to control the swing of the inverting plate, the vertical movement of the receiver stand, the swing of the cover plate and the insertion of the cigarette disorder preventing means

according to the level of the cigarettes within the hopper.

6. The apparatus of claim 1 wherein said cigarette tray feeding means comprises a plurality of hand-pushable cigarette tray transporting vehicles that can be connected in the longitudinal direction and an intermittently feeding mechanism for moving said tray transporting vehicles intermittent in the longitudinal direction.

7. The apparatus of claim 6 wherein feed pins disposed at predetermined intervals are provided on one side portion of the cigarette tray transporting vehicles, and the intermittently feeding mechanism includes a member for moving said cigarette tray transporting vehicles intermittently by the distances between the feed pins by engagement with the feed pins, and the cigarette trays are arranged on the cigarette tray transporting vehicles at intervals corresponding to the intervals between the feed pins.

8. The apparatus of claim 1 wherein said cigarette tray delivering and withdrawing means comprises a frame disposed above a passageway of the cigarette feeding means, a moving plate connected to an endless chain provided in said frame and reciprocating at right angles to the feed passageway, and an arm connected to said moving plate and delivering and withdrawing the tray by reciprocating together with the moving plate.

9. The apparatus of claim 8 wherein said arm comprises a first arm fixed to said moving plate and having an opening at its forward end and a second arm connected swingably to the first arm and having a hook which plunges into, and projects from, the opening of said first arm, said hook being plunged in said opening for a first certain period of the process during which the arm delivers the cigarette tray towards the inverting plate and a last certain period during which the tray is withdrawn from the inverting plate, and is projected from the opening at other times.

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