Dec. 27, 1960 J. BACSÁK 2,966,020

PACKING MACHINE

Filed April 13, 1959 5 Sheets-Sheet 1

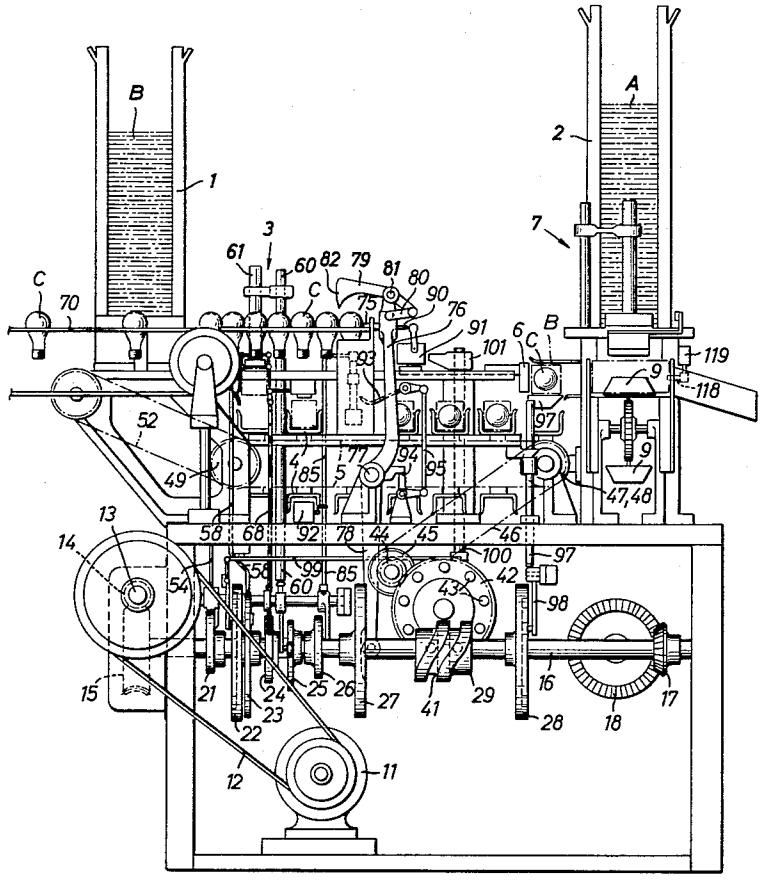


Fig. 1

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PACKING MACHINE

Filed April 13, 1959 5 Sheets-Sheet 2

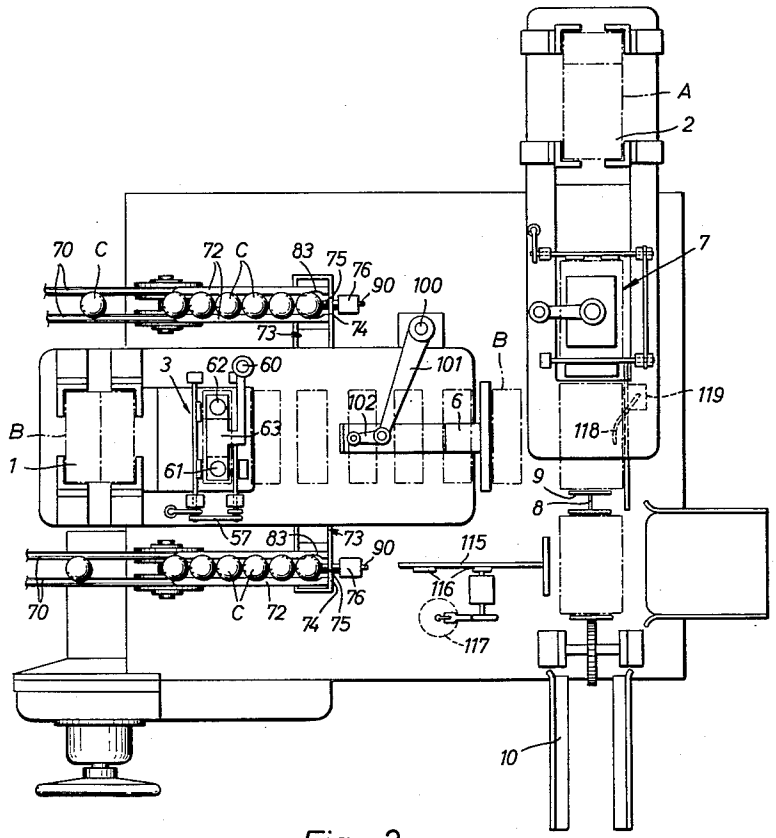


Fig. 2

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PACKING MACHINE

Filed April 13, 1959 5 Sheets-Sheet 3

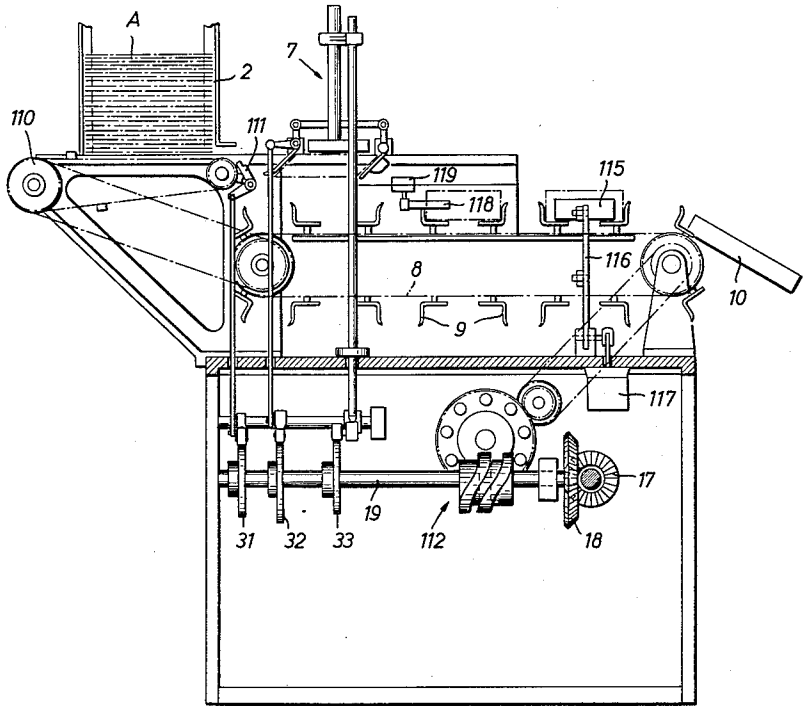


Fig. 3

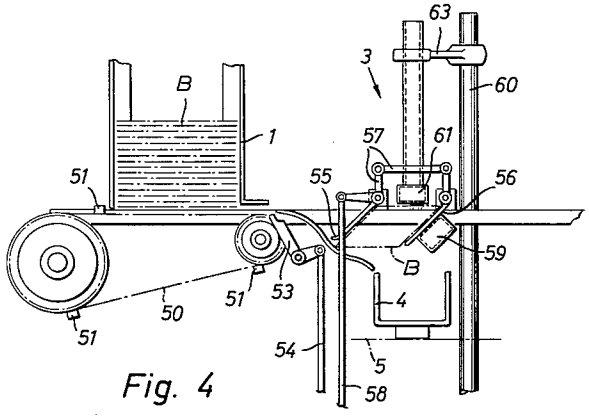


Fig. 4

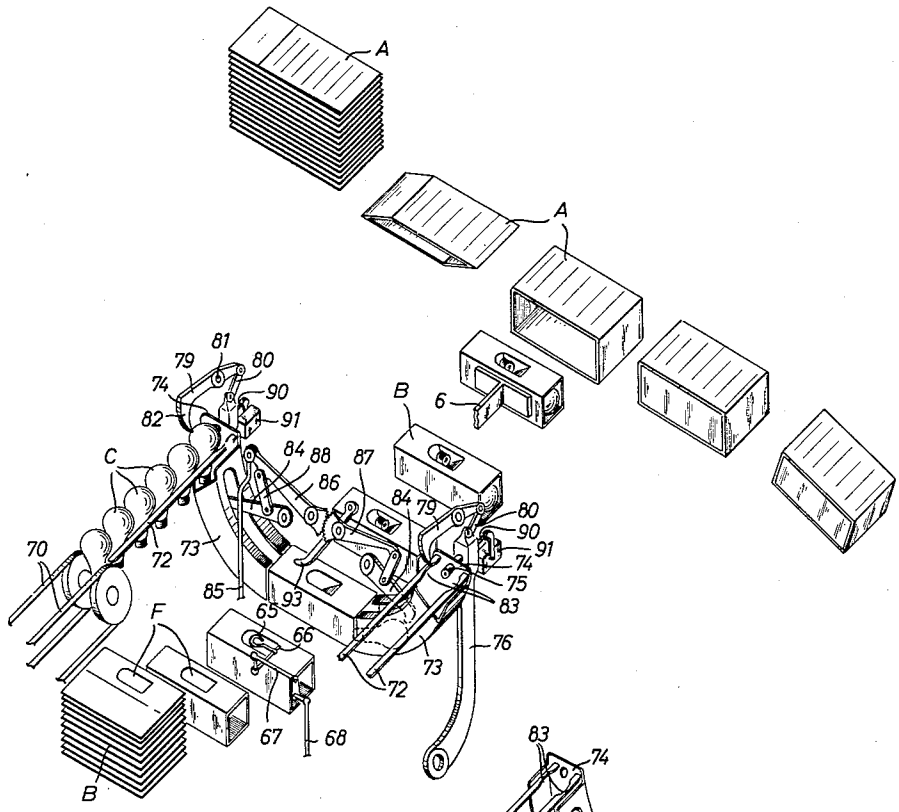

A
A
B
6
81
79
80
74
90
82
91
C
84
88
86
87
84
79
80
90
91
74
75
83
70
72
73
85
93
65
66
F
76
73
72
67
68
B

Fig. 5

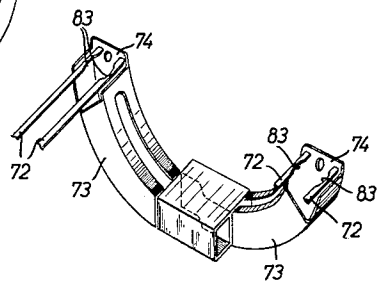

83
74
72
73
83
74
72
83
72
73

Fig. 6

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PACKING MACHINE

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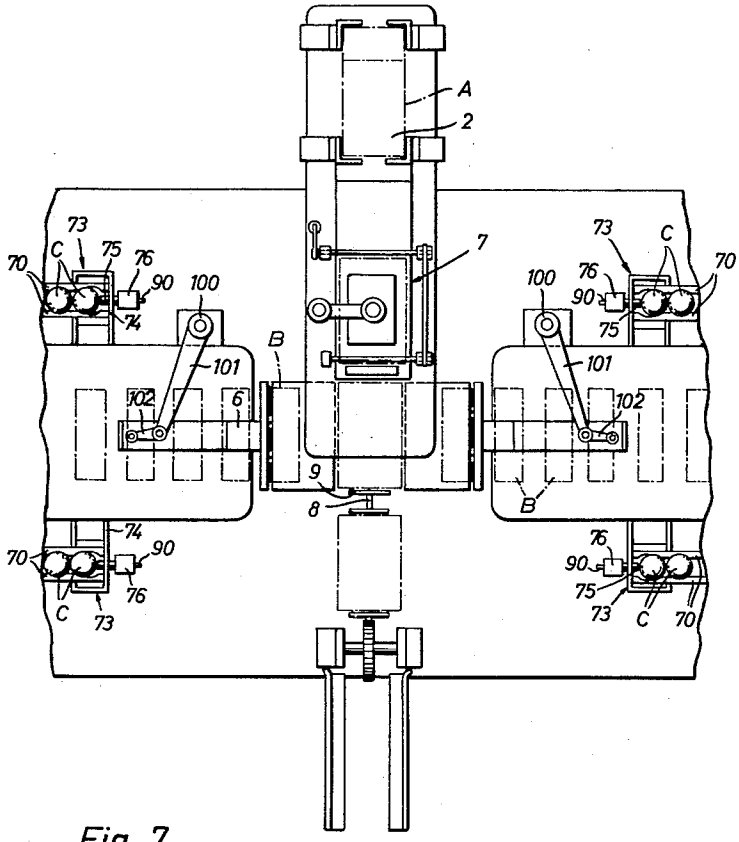


Fig. 7

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2,966,020

PACKING MACHINE

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5 Claims. (Cl. 53—128)

My invention relates to a machine for packing fragile articles such as incandescent lamps, into box shaped containers of corrugated cardboard or the like. It is a particular object of the invention to provide a machine of this kind which may be directly connected to one, or simultaneously to a plurality of, automatic manufacturing apparatus for incandescent lamps, and which automatically executes the packing of the incandescent lamps ejected from such apparatus.

For this purpose, the machine according to the present invention comprises two supply means preferably arranged in parallel relationship to each other, each of said supply means comprising two endless travelling belts adapted to carry between them the articles to be packed, stationary slide rails forming an extension of said belts, an arcuate sliding chute associated with each pair of said slide rails and arranged at the end thereof in a vertical plane, transverse pusher means engaging in said sliding chute and adapted to be operated in timed relationship with the machine operating cycle, intermittently operable first conveyor means arranged between the opposite adjacent openings of said sliding chutes and adapted to bring folding boxes which have been removed from a stack and opened successively in front of the openings of said sliding chutes where they are filled with the articles, second intermittently operable conveyor means arranged transversely of said first conveyor means and adapted to bring outer casings which have been removed from a stack and opened, in front of the outlet of said first conveyor means, and pusher means swingable parallel to said last named conveyor means and adapted to fill said outer casings successively with said folding boxes containing the articles.

According to a further feature of the present invention, there is provided in front of the folding box filling station a finger swingable in timed relationship with the machine cycle, which finger pushes a tab cut out in the upper side of the opened folding boxes into the folding box, so that the subsequently inserted articles are separated from each other by this tab.

The machine constructed and arranged in this manner is completely automatic in operation, the incandescent lamps or similar fragile articles being nevertheless treated very carefully, also in cases where the supply to the machine is not quite uniform or regular.

The object of the present invention is illustrated by way of example in the accompanying drawings in which

Fig. 1 is a side elevation of a machine for packing incandescent lamps;

Fig. 2 is a plan view of this machine;

Fig. 3 is another side elevation of the machine showing in particular the supply and feeding means for the outer casings;

Fig. 4 is an elevation showing the supply and feed means for the folding boxes at an enlarged scale;

Fig. 5 is a perspective view of the incandescent lamp supply and packing means;

Fig. 6 is a perspective view of another incandescent lamp supply means; and

Fig. 7 is a plan view of another embodiment of the machine according to the present invention.

The machine shown by way of example in Figs. 1 to 6 is adapted to pack four incandescent lamps C into one package which comprises an outer casing A, and two folding boxes B, each of which contains two incandescent lamps, and which are inserted into the outer casing A.

This machine comprises a stack 1 for flattened folding boxes B, and a stack 2 for flattened outer casings A. As may be seen from Figs. 1 and 2, the folding boxes B are removed successively from the stack 1; they are then opened by means of an opening device 3 and fed to the buckets 4 of a conveyor 5, whereupon an incandescent lamp C is inserted from each side into the folding boxes B. Two folding boxes filled in this manner are then inserted successively into an outer casing A which has previously been removed from stack 2, opened by an opening device 7, and fed to a conveyor 8. The package formed in this manner is then transported to the outlet 10 of the machine.

In detail, the machine illustrated in Figs. 1 to 6 is arranged as follows:

The machine is driven by an electric motor 11 (Fig. 1), from which the drive is transmitted through a belt 12 to a transverse shaft 13 on which is secured a worm 14 which through a worm gear 15 drives the main shaft 16 of the machine. Through bevel gearing 17, 18 giving a reduction of 2:1, the main shaft 16 drives an auxiliary shaft 19 which is arranged normal to the main shaft 16 (Fig. 3). The movements of the various devices of the machine are controlled by cams 21—28 secured on the main shaft 16, and by cams 31—33 secured on the auxiliary shaft 19.

The intermittent of step-by-step drive of the conveyor 5 (Fig. 1) is taken from a cylindrical cam 29 fixed on the main shaft 16, which cam has formed therein a helical groove 41 of irregular pitch into which engage pins 43 fastened on a disk 42. The disk 42 is provided with external teeth which are in mesh with the teeth of a gear 44 connected with a chain sprocket 45. The sprocket 45 cooperates with a chain 46 which in turn drives a sprocket 48 connected with the reversing wheel 47 of conveyor 5.

The folding boxes B are successively pushed out of the stack 1 by dogs 51 secured to a chain 50, in timed relationship with the operating cycle of the machine (Fig. 4). The chain 50 is driven from the second reversing wheel 49 of conveyor 5 through a chain 52. After a folding box B has been removed from the stack 1, a pusher 53 becomes operative which by means of a swinging movement feeds the folding box B completely into the opening device 3 and aids in the opening operation. Its feeding movement is controlled by cam 21 of shaft 16 through a linkage 54.

The flat folding box B advanced by the pusher 53 comes between two swinging arms 55, 56 (Fig. 3) arranged one behind the other (Fig. 3). The rear arm 56 is provided with a suction head 59 which is connected with a suitable source of suction and is provided with suction nozzles on the inside of arm 56. The two swinging arms 55, 56 are connected with each other by a linkage 57, and through a further linkage 58 are also connected with cam 23 of shaft 16. In order to hold the folding box B securely during opening, two suction heads 61, 62 (Fig. 2) are fastened in side-by-side relationship on a rod 60 by means of a bracket 63, and grip the upper side of the folding box B (Fig. 1) by means of suction. The opening of the folding box B is effected in such a manner

that the two swinging arms **55**, **56**, which are at first in a horizontal position are swung through 90° by the cam **23** through the intermediary of linkage **58**, whilst the suction heads **61**, **62** and the suction head **59** retain the front and upper side of the folding box B. Following this, the opened box B is fed into a bucket **4** of the conveyor **5** to which end a downward movement is imparted to the rod **60** by the cam **25** (Fig. 1), whereupon the vacuum is cut off from the suction heads **61**, **62**. Simultaneously with the return movement of the suction heads **61**, **62** and of the arms **55**, **56** into their original position, the conveyor **5** is advanced one step, or indexed.

In order to prevent direct contact of the incandescent lamp C during the subsequent filling of the folding boxes B, a tab F cut out in the upper side of the folding box B is pushed into the latter on the following station of the machine (Fig. 5). This pushing-in is accomplished by means of a finger **65** which is secured to a shaft **66**, and is connected with cam **24** of shaft **16** by means of a linkage **67**, **68**.

After another indexing step of the conveyor **5** the folding box B prepared in such manner for the filling operation, arrives at the filling station where it is simultaneously filled with two incandescent lamps C in such a manner that the sockets of the lamps are situated adjacent one another in the middle of the folding box B. The supply of lamps C which may, for example, come from automatic machines for manufacturing incandescent lamps, to the filling station is accomplished by means of two continuously driven endless V-belts **70** and slide rails **72** which are arranged directly contiguous to said V-belts and form a continuation thereof (Fig. 5). The slide rails **72** lead to two arcuate sliding chutes **73** which are arranged in face-to-face relationship and are defined by side walls **74**. Above the sliding chutes **73**, the slide rails **72** are provided with arcuate recesses **83** through which the incandescent lamps C pass into the sliding chutes **73** (Fig. 6). In order to assure that only one lamp C at a time may arrive over these recesses **83** and may thus fall into chute **73**, a pin **75** (Figs. 2 and 5) projects through each of the side walls **74** of the sliding chutes **73** at the height of the greatest diameter of the incandescent lamps C suspended on the slide rails **72**, and in the middle between the latter, which pin retains the lamps C. The pins **75** are secured to levers **76** which are fixed on a shaft **77** (Fig. 1). Also fixed on the shaft **77** is a lever **78** which with its lower extremity engages cam **27** of shaft **16**. Arms **79** pivotably supported at **81** and provided with a wedge **82** at their free end, are articulated to the upper ends of levers **76** by means of links **80**. After a bucket **4** of the conveyor **5** has brought a folding box B between the inner openings of the sliding chutes **73**, the levers **76** are swung back by the cam **27** of shaft **16**, whereby the pins **75** are withdrawn from the chutes **73**. By this movement the arms **79** are lowered simultaneously so that the wedges **82** penetrate between the foremost and the next following of the incandescent lamps C situated on the slide rails **72**. Thereby, the foremost of the lamps C come to be situated above the recesses **83** and fall into the sliding chutes **73**. Following this, transverse pushers **84** penetrate into the chutes **73** and push the two lamps C completely into the prepared folding box B. The control of these pushers **84** is effected from the cam **26** of shaft **16** through a linkage **85** connected with an arm **86** which in turn is drivingly connected by means of gear teeth with another symmetrically arranged arm **87**. The pushers **84** are connected with these two pivotally mounted arms **86**, **87** by means of links **88** (Fig. 5).

The filling device described in the foregoing is provided with safety means which switch off the machine when the supply of lamps is lacking or when a lamp breaks. For the purpose of determining whether incandescent lamps C are available on the slide rails **72** for filling into the folding boxes B, feeler pins **90** (Figs. 1, 2 and 5) are arranged in axial bores of the pins **75** which retain the lamps C. In their non-depressed position these feeler pins project beyond the front end of the retainer pins **75** and are operatively connected with a switch **91** at their rear end. If one or both of these pins **90** are not forced back into the bolts **75** by the lamps C at a given time and the corresponding switch **91** is thus not operated, the circuit of the driving motor **11** is interrupted until new incandescent lamps C are again supplied by the supply means.

Furthermore, the driving motor **11** is stopped by switch **92** (Fig. 1) when a pusher **84** becomes jammed in a chute **73** due to breakage of an incandescent lamp C so that the linkage **83** cannot execute its full travel, and consequently does not operate a control contact in switch **92**.

The feeding of lamps C into the sliding chutes **73** is interrupted when there is no folding box B ready for filling. This is sensed by a feeler **93** (Figs. 1 and 5) which is arranged between the two sliding chutes **73**. If no folding box B is present, this feeler **93** through a linkage **95** and a ratchet device **94** blocks the return movement of the levers **76**, so that no lamps C can enter the chutes **73**.

After further indexing steps of the conveyor **5** the filled folding boxes B are lifted from the buckets **4** of conveyor **5** by a vertical pusher **97**, and successively inserted into waiting outer casings A by the pusher **6** (Figs. 1, 2 and 5). The vertical pusher **97** is controlled by cam **28** of shaft **16** through a lever **98**. The pusher **6** receives its inserting or loading movement from the cam **22** of shaft **16** through a bell-crank linkage **99** connected to a vertical shaft **100** to which the pusher **6** is articulated by means of an arm **101** and a link **102**.

As may be seen from Fig. 3 the outer casings A are treated by devices presenting a construction corresponding to that of the devices for the folding boxes B, but dimensions which are adapted to the outer casings A, i.e. supply means **110**, a pusher **111**, opening means **7**, and a conveyor **8** which is driven from an auxiliary shaft **19** through gearing **112** of a construction similar to that of the gearing which drives conveyor **5**, moves one step for every two steps of conveyor **5** due to the reduction provided by bevel gearing **17**, **18**.

In order to assure that only complete packages filled with two folding boxes B arrive at the outlet **10** of the machine, an ejector device for incompletely filled outer casings A is provided. As shown in Figs. 2 and 3, this ejector device comprises a slider **115** which by means of a linkage **116** is connected with the armature of an electro-magnet **117**. The magnet **117** is energized with delayed action when an outer casing A has been filled with only one folding box B. This is sensed by a feeler **118** which is situated at the filling station for the outer casings and operates a switch **119**.

For the filling of incandescent lamps C into folding boxes adapted to receive two lamps which are arranged side by side and are separated by an intermediate wall (tab F), the chutes **73** are arranged in offset relationshsip to each other as shown in Fig. 6, whereas otherwise the arrangement of the machine remains as illustrated.

It is also possible to pack only one folding box. into a corresponding outer casing. For this purpose it is only necessary to set the ratio of the bevel gears **17**, **18** at 1:1.

For the packing of a single lamp into a corresponding folding box B and outer casing A the retaining bolts **75** and the transverse pushers **84** of the individual sliding chutes **73** are operated in alternate sequence so that the filling of the folding boxes is accomplished once from the left and once from the right.

According to the embodiment shown in Fig. 7, the machine may also be constructed in such a manner that one folding box B is inserted into the outer casing A from each side. For this purpose there is provided opposite the stack **1** for folding boxes B shown in Fig. 2

(but not shown in Fig. 7) and on the other side of the conveyor 8 for the outer casings A, a second stack for folding boxes (also not shown). The arrangement and construction of these stacks, the means for opening and filling the folding boxes B, and the means for feeding the incandescent lamps C correspond exactly to the arrangement and construction of the apparatus shown in Fig. 2. In correspondence with the embodiment shown in Fig. 2, there are provided according to Fig. 7 at both sides of the two feeding paths for the folding boxes from the two stacks (not shown in the drawings), feeding means **70** for the incandescent lamps C, sliding shafts **73**, pins **75**, levers **76**, feeler pins **90**, and a pusher **6** reciprocable by means of an arm **101** supported at **100** and an articulation. The outer casings A are fed from the stack **2** by the conveyor **8** in a manner similar to that shown in and described with reference to Figs. 1 to 6. Filled folding boxes B are then introduced simultaneously from both sides into the outer casing A. The drive means for the movable parts of the machine are constructed in the same manner as in the machine according to Figs. 1 to 6. In the embodiment according to Fig. 7 the machine may be simultaneously connected to four machines for manufacturing incandescent lamps, whereby its capacity is further improved to a considerable extent.

What I claim is:

1. A machine of the type specified, comprising two supply means arranged in parallel relationshsip to each other, each of said supply means comprising two endless travelling belts adapted to carry between them the articles to be packed, a pair of slide rails in continuation of each of said supply means, an arcuate sliding chute associated with each of said pairs of slide rails and arranged at the end of said rails in a vertical plane, transverse pusher means adapted to penetrate into the outer end of each of said sliding chutes and operable in timed relationship with the operating cycle of the machine, means for removing folding boxes from a stack and means for opening said folding boxes, first intermittently operable conveyor means arranged between the oppositely adjacent openings of said two sliding chutes and adapted to feed opened folding boxes successively in front of the openings of said sliding chutes, means for removing outer casings from a stack and means for opening said outer casings, second intermittently operable conveyor means arranged transversely of said first conveyor means and adapted to feed the opened outer casings in front of the outlet of said first conveyor means, and longitudinal pusher means oscillable in a direction parallel to said first conveyor means and adapted to insert the folding boxes containing the articles to be packed, successively into the outer casings.

2. The machine as specified in claim 1, in which means are provided for controlling said transverse pusher means and said longitudinal pusher means in such a manner that by each of said transverse pusher means one article is inserted into a folding box during each operating cycle of the machine, and two folding boxes are successively inserted into an outer casing by said longitudinal pusher means.

3. The machine as specified in claim 1, in which means are provided adapted to control said transverse pusher means and said longitudinal pusher means in such a manner that only one article is alternately inserted from said two sliding chutes into a folding box, and that only one folding box is inserted into an outer casing by said longitudinal pusher means.

4. The machine as specified in claim 1, in which said supply means for feeding the articles and said sliding chutes, as well as said stacks and means for, removing, opening and feeding the folding boxes are provided in duplicate and are so arranged that said conveyor means for the outer casings constitutes the axis of symmetry for the two sets of the said means.

5. The machine as specified in claim 1, in which an oscillable member is arranged in front of the station for filling the folding boxes and over said conveyor means for the folding boxes, said oscillable member being adapted to push a tab provided on the upper side of the folding box into the opened folding box.

No references cited.