

March 6, 1956

W. WALRAVE ET AL
PACKAGING MACHINES

2,736,998

Filed Aug. 15, 1951

9 Sheets-Sheet 1

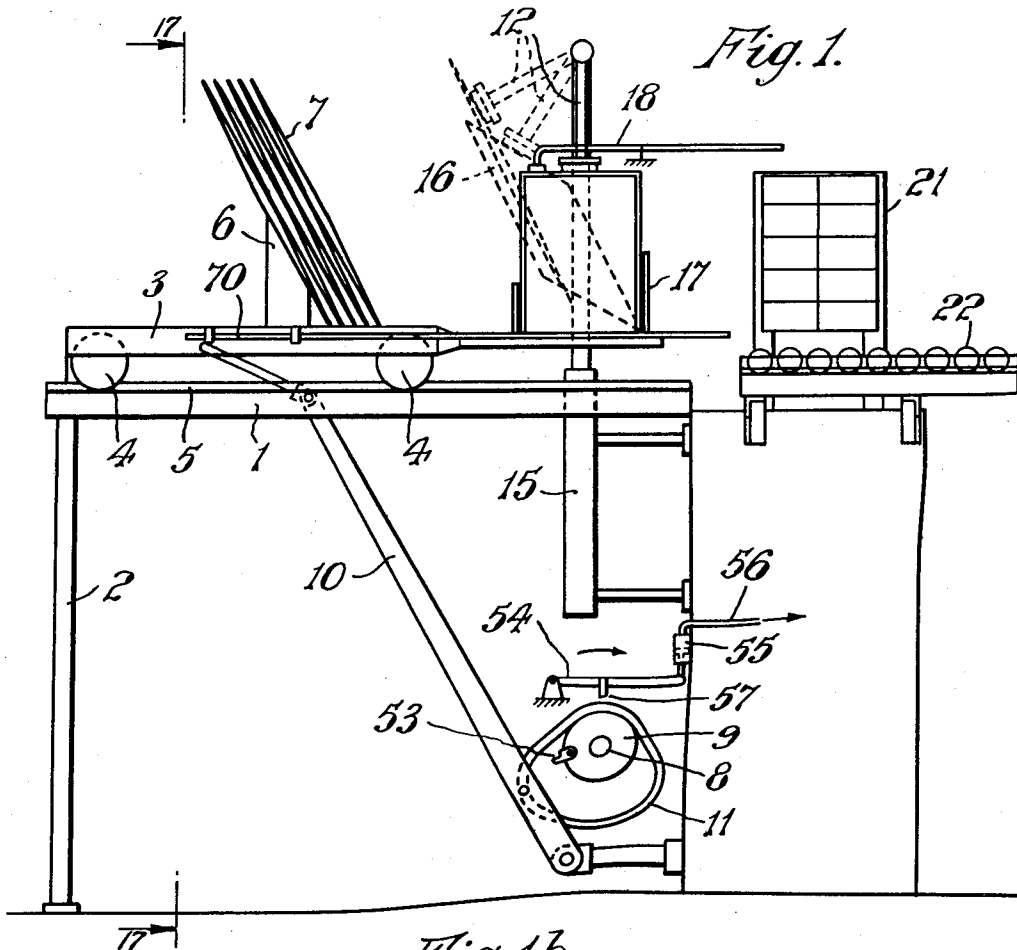


Fig. 1a.

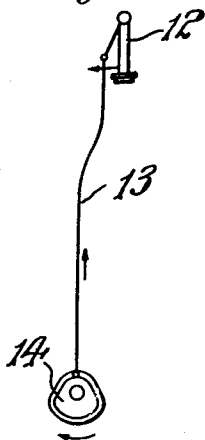


Fig. 1b.

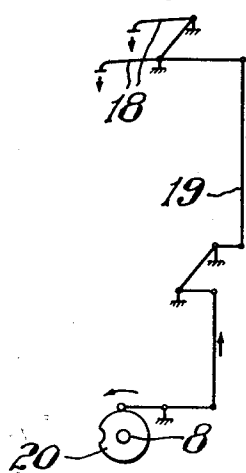
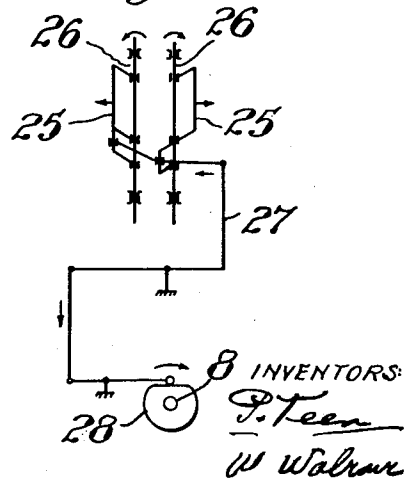


Fig. 3a.



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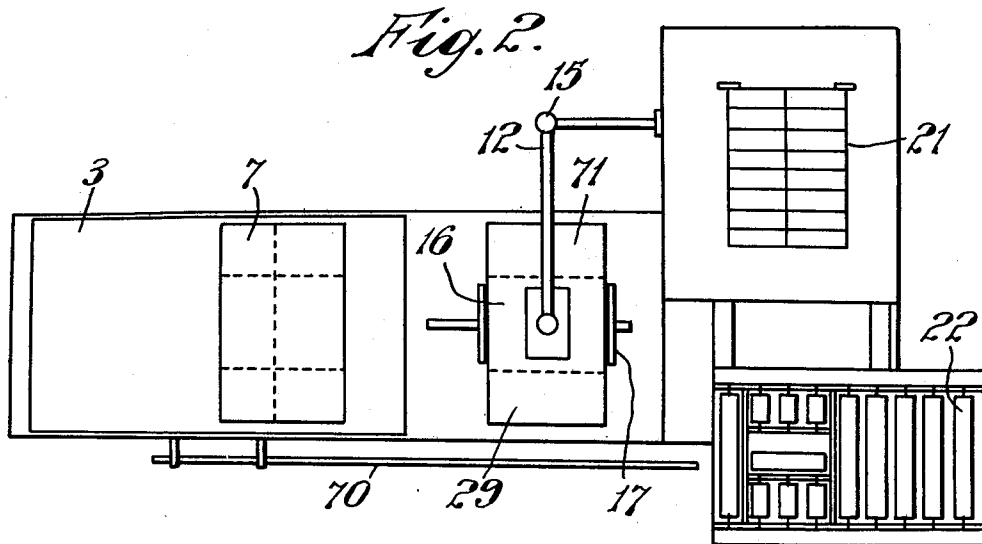
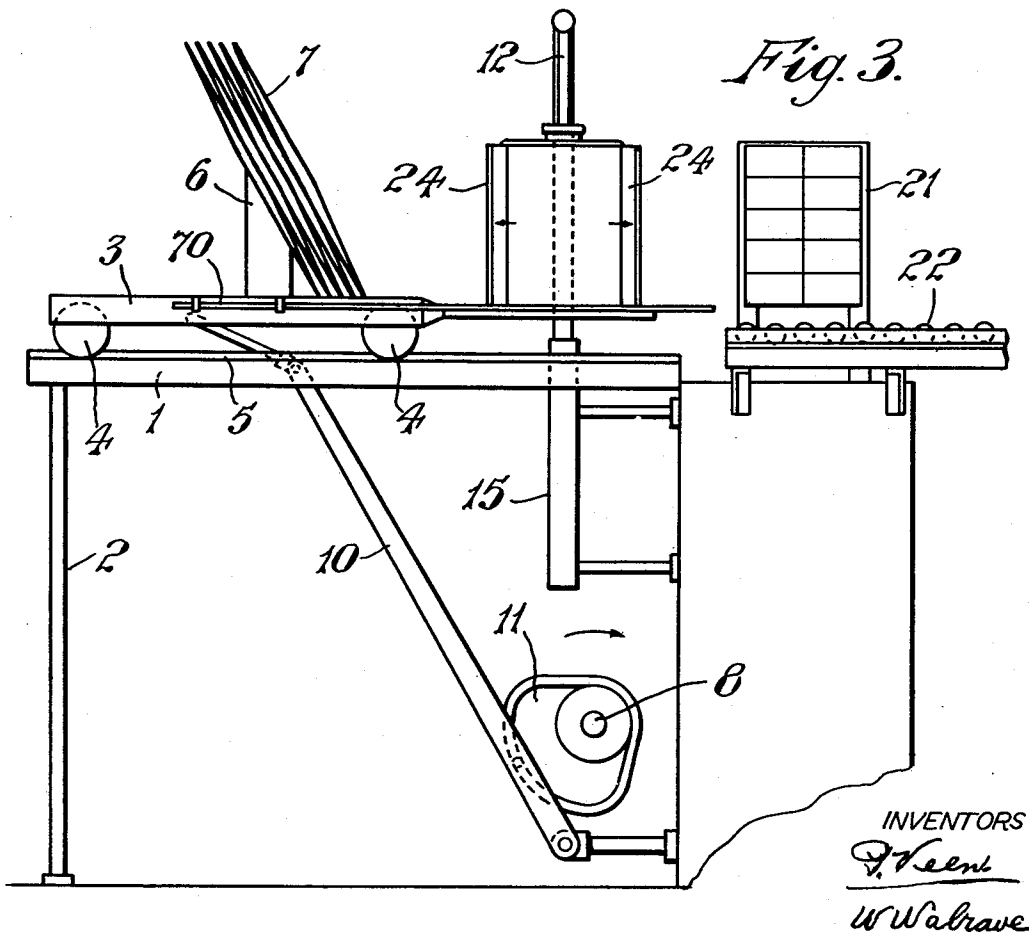
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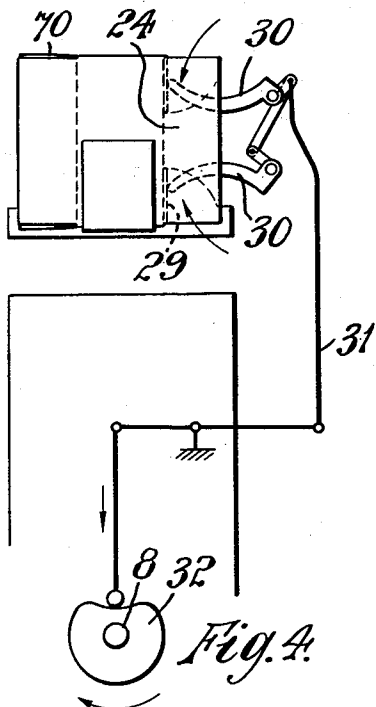
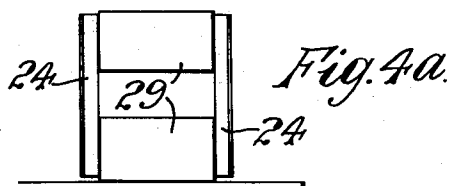
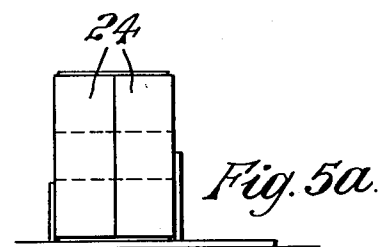
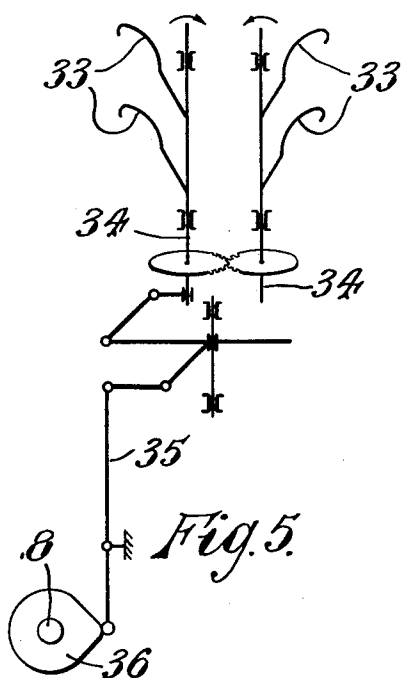
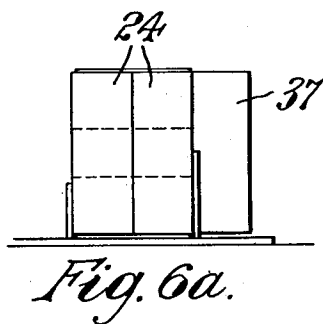
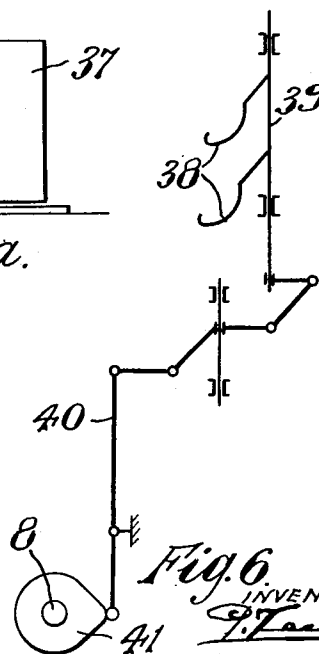
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INVENTORS
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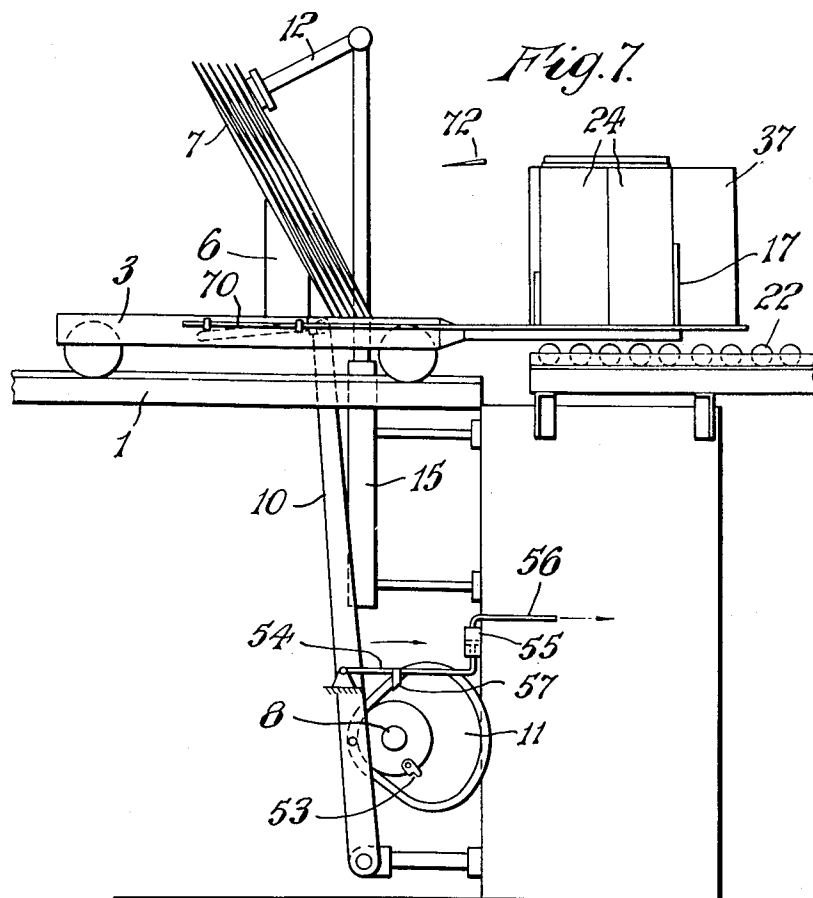
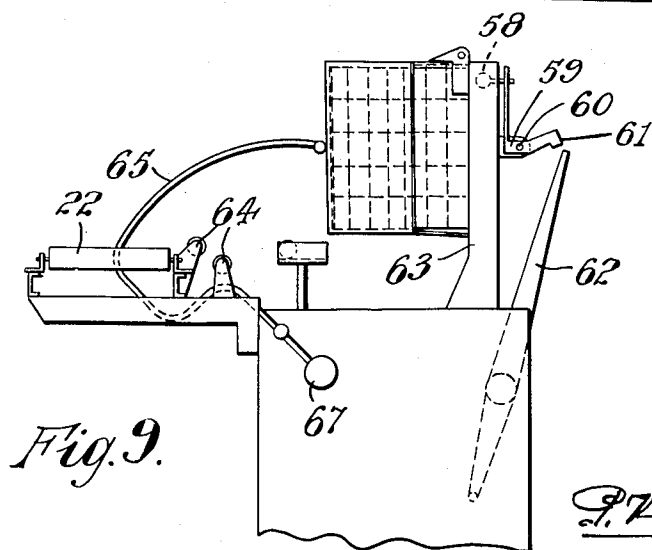
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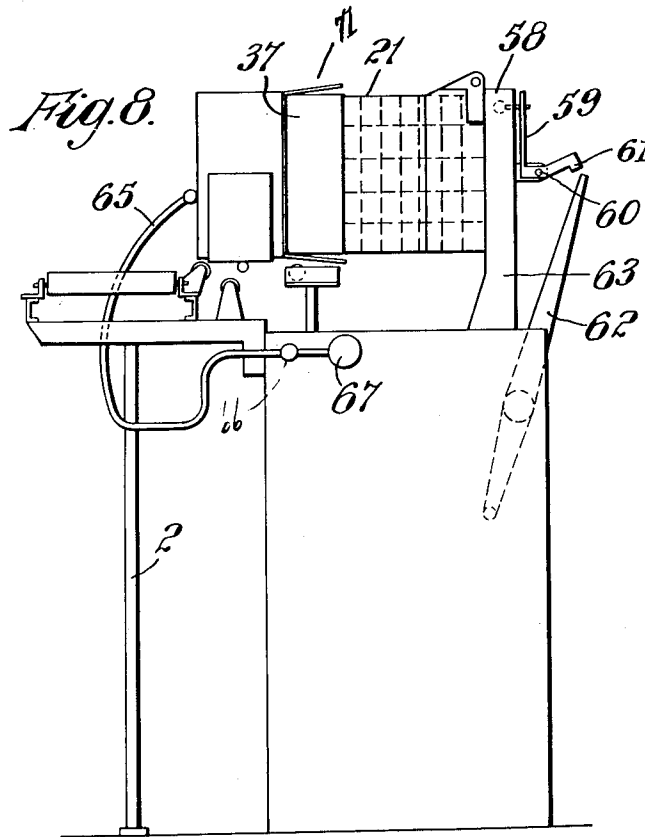
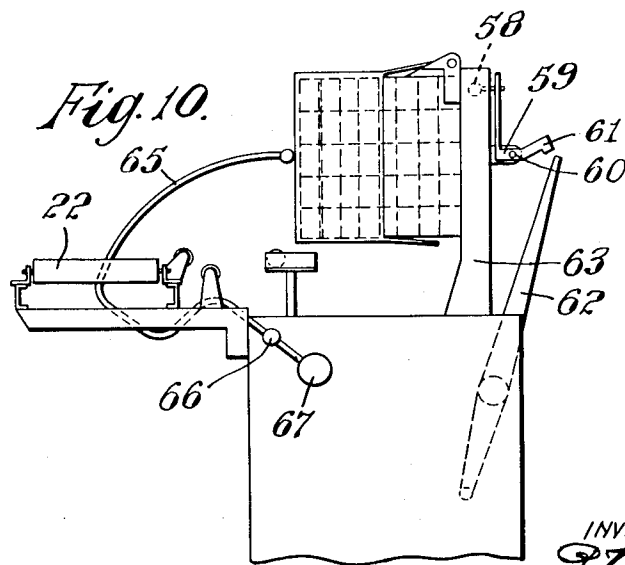
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INVENTORS
J. T. Lee
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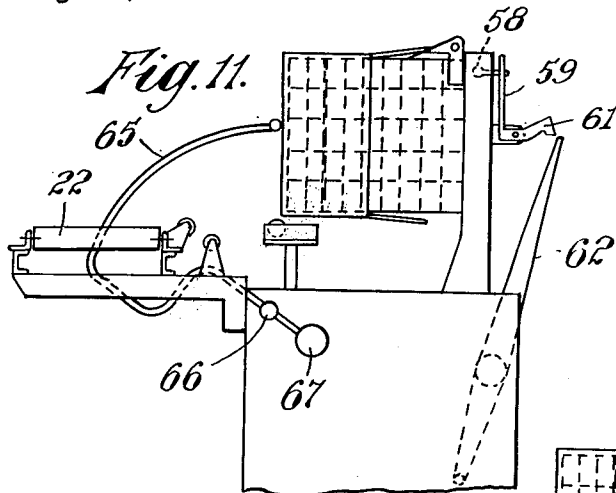
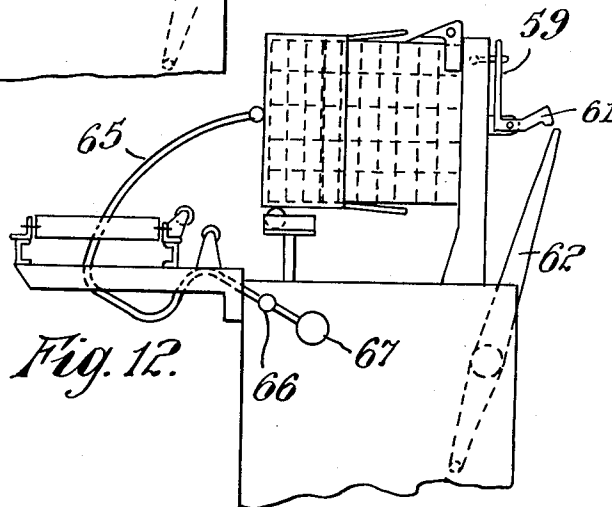
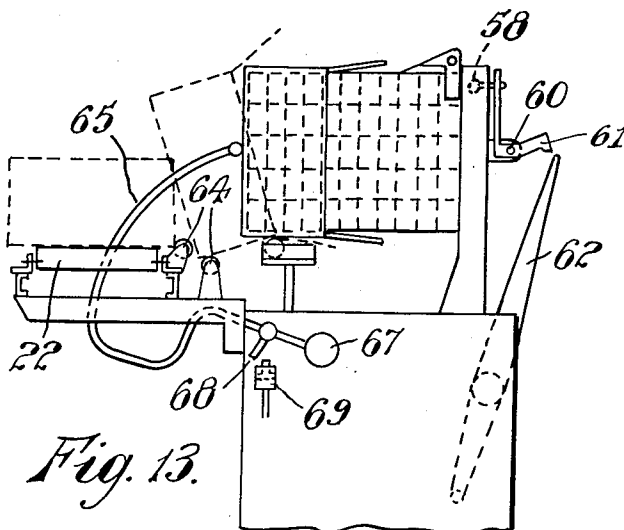
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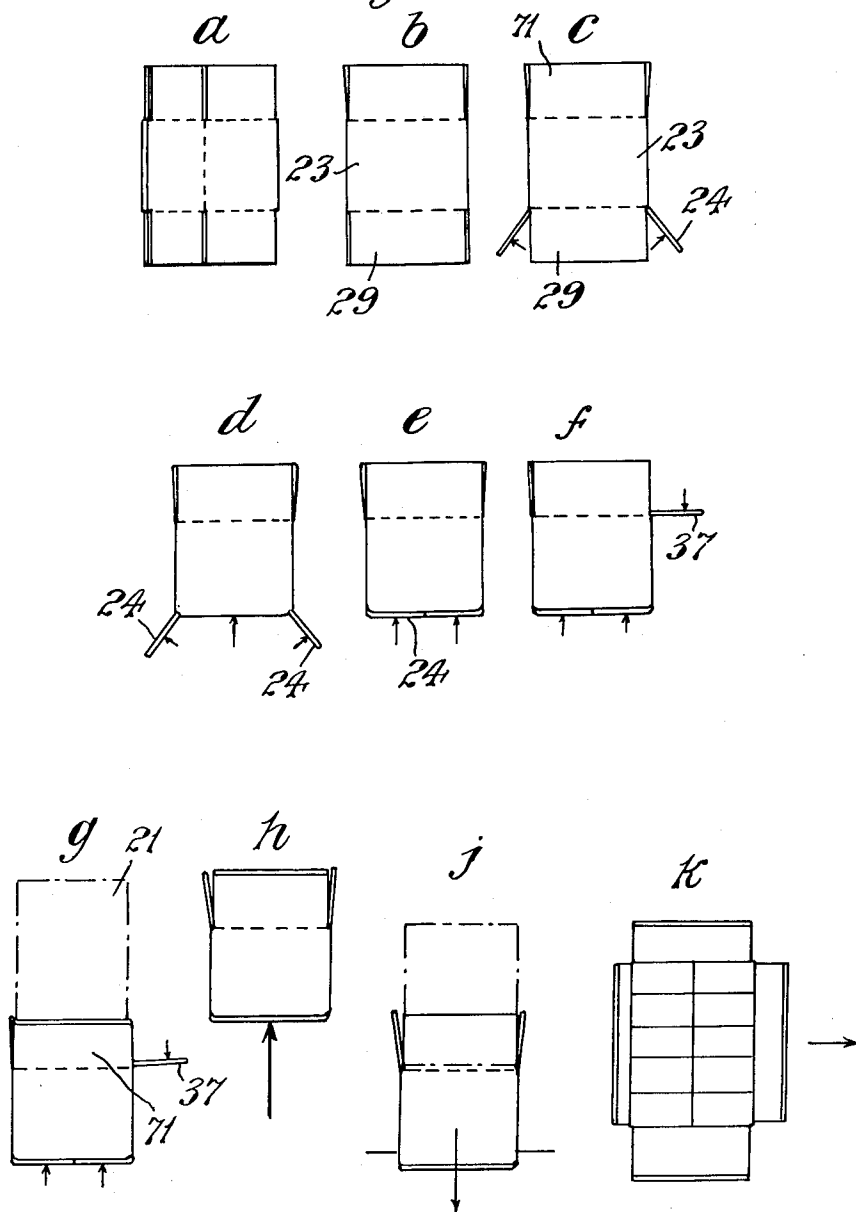
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Fig. 14.



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Fig. 15.

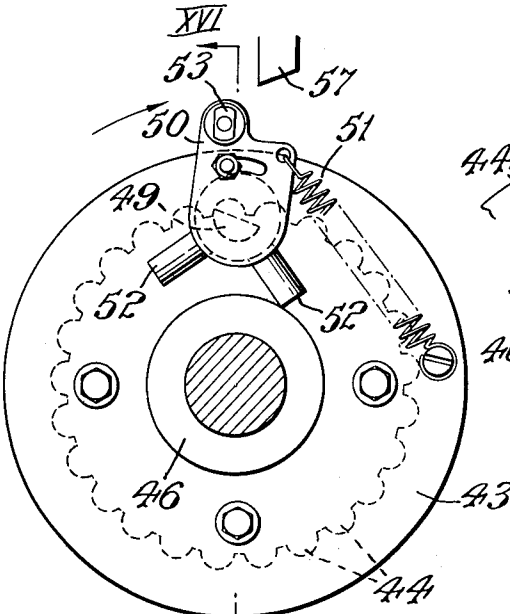
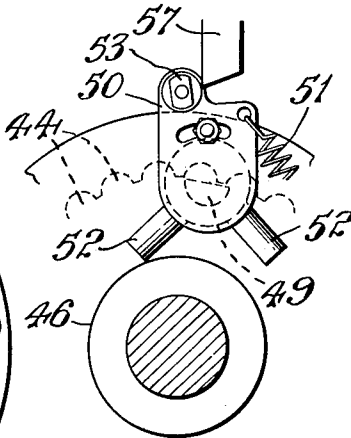
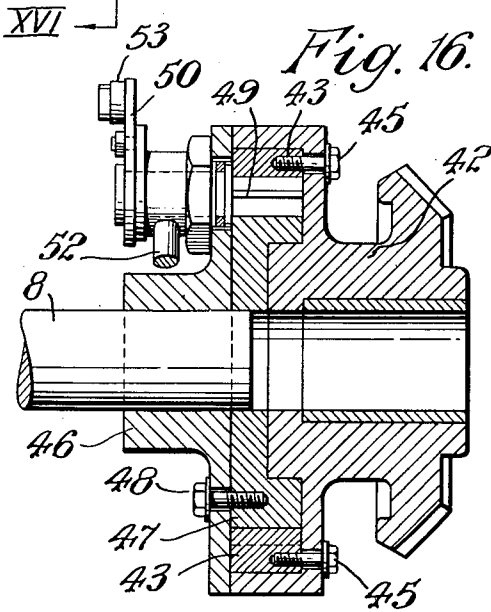


Fig. 15a.



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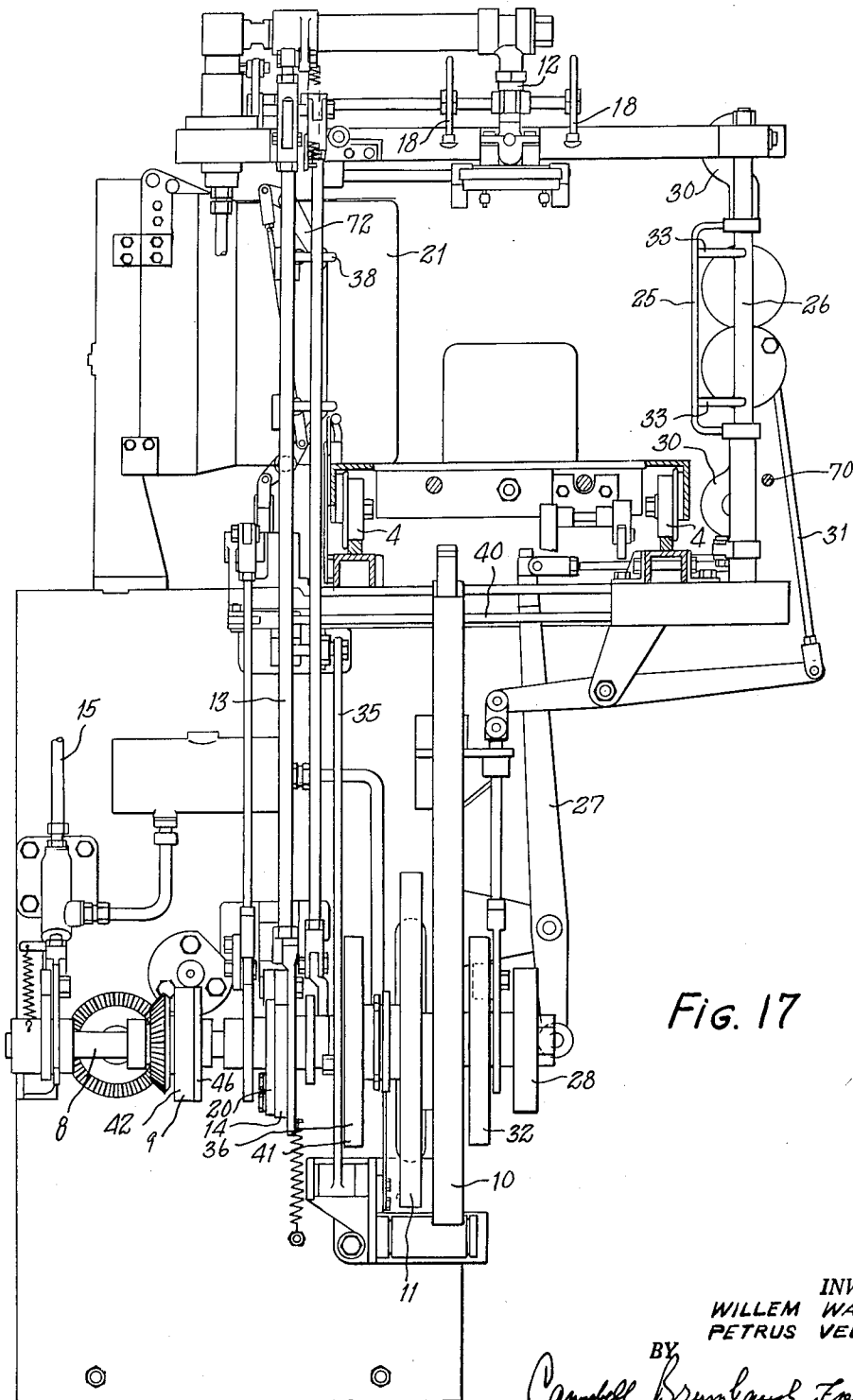


Fig. 17

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PACKAGING MACHINES

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Application August 15, 1951, Serial No. 242,019

Claims priority, application Netherlands August 17, 1950

10 Claims. (Cl. 53—26)

This invention relates to packaging machines and more particularly to machines for erecting flat cases and to machines for erecting cases and pushing the erected cases over the assembly portion of an article assembling machine.

A number of article assembling machines are known, for example U. S. specification No. 2,498,071 describes an article assembling machine which stacks articles into layers and then inserts the layers into a magazine which forms the assembly portion of the assembling machine. The machine operator erects by hand a flat case made, for example, from fibreboard, and places it over the magazine. As new layers of articles are inserted into the magazine the case gets pushed away from the magazine and, when filled, is ejected therefrom. The operator then places a new case over the magazine and the cycle of operation is repeated.

It is an object of the present invention to provide a machine for erecting a flat case.

It is a further object of the present invention to provide a machine which erects a flat case and pushes the erected case over the assembly portion of an article assembling machine.

According to the present invention there is provided a case erecting machine comprising a case magazine for flat cases, an arresting edge, and pick-up means for taking a flat case from the magazine and forcing it against the arresting edge to erect the case.

In a preferred form of the case erecting machine, the case magazine and the arresting edge are mounted on a trolley, and means are provided for reciprocating the trolley.

According to another aspect of the present invention, there is provided a packaging machine comprising means for erecting a flat case and means for pushing the erected case over the assembly portion of an article assembling machine.

It is preferred to use the case erecting machine referred to above for erecting the case.

A preferred form of a packaging machine utilising a preferred form of the case erecting machine will now be described with reference to the accompanying drawings in which:

Fig. 1 is a side elevation of the machine in a position which may be regarded as the starting position of the cycle.

Fig. 1a shows part of the pick-up means and the link mechanism for actuating it.

Fig. 1b shows the case releasing means the link mechanism for actuating it.

Fig. 2 is a plan view of the machine shown in Fig. 1.

Fig. 3 is a side elevation of the machine at the second phase of operation.

Fig. 3a shows the means for opening the rear vertical case flaps and the link mechanism for actuating it.

Fig. 4 is a side elevation of a part of the machine at the 3rd phase of operation showing the means for

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closing the rear horizontal case flaps and the link mechanism for actuating it.

Fig. 4a shows an end view of the case.

Fig. 5 is a side elevation of part of the apparatus at the 4th phase showing the means for closing the rear vertical case flaps and the link mechanism for actuating it.

Fig. 5a shows an end view of the case.

Fig. 6 is a side elevation of the machine at the 5th phase of operation.

Fig. 6a shows an end view of the case.

Fig. 7 is a side elevation of the machine at the 6th phase of operation.

Fig. 8 is a side elevation of the machine perpendicular to that shown in Fig. 7.

Figs. 9-13 are side elevations of the machine showing the filling and ejection of a case.

Figs. 14a-k show plan views of the case during the various phases of operation.

Fig. 15 shows a plan view of a shaft clutch.

Fig. 15a shows part of the plan of the clutch with the clutch disengaged.

Fig. 16 is an elevation of the clutch on the lines XVI-XVI partly in cross section.

Figure 17 is a view in transverse section taken substantially on the line 17-17 of Figure 1 looking in the direction of the arrows.

In Figures 4, 5 and 6 only the operating parts of the machine have been shown, the framework, etc. being omitted.

Figs. 1b, 3a, 5 and 6 are diagrammatic.

Like reference numerals will be used to describe like parts.

The machine is mounted on a structure 1 supported by legs 2. A trolley 3, which is provided with wheels 4, is capable of moving to and fro on a platform 5. A case magazine 6 holding a stack 7 of flat folded cases is mounted on the trolley 3.

All movements required to actuate the various parts of the machine are taken from a common shaft 8 which is driven through a clutch 9. The driving side of the clutch may be coupled to an electric motor, but it is preferred to couple it to the shaft of the assembling machine.

The reciprocating movement is imparted to the trolley 3 by means of a lever 10 consisting of two sections connected by a pin-point. The lower section of the lever 10 is actuated by means of a cam 11 on the common shaft 8.

The vacuum operated pick-up means comprise a suction arm 12 to which is imparted an oscillatory movement by means of a link mechanism 13 which is actuated by means of a cam 14 on the common shaft 8, see Figs. 1 and 1a. Vacuum is supplied to the suction arm 12 by means of a vacuum pipe 15. The purpose of the suction arm 12 is to pick up a flat case 16 from the case magazine 6 when the magazine is moved to the right, and to force the case against an arresting edge 17 as a result of which the case is erected and is given the shape indicated in Fig. 1 by means of the unbroken lines. The intermediate positions of the case during erection are indicated by the broken lines. Fig. 1 also shows the downward movement of the lower end of the suction arm 12, which causes a corresponding downward movement of the upper side of the case during the movement of the arm from left to right.

The supply of vacuum to the pipe 15 is controlled by means of a valve operated by a cam (not shown) on the common shaft 8. The cam is adjusted so that vacuum is supplied for picking up a flat case from the case magazine and for gripping and holding it until the completion of the 4th phase. Since the case has a tendency to stick to the suction arm 12 even when the vacuum is released,

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a set of releasing arms 18 operated by a link mechanism 19 actuated by a cam 20 on the common shaft 8 is used to assist the breaking of contact between the suction arm and the case. The arms 18 also assist in giving the case a strictly rectangular form.

Thus, in the 1st phase, the trolley 3 moves to the right while the suction arm 12 swings to the left. Suction is applied and when the suction arm comes into contact with a case on the case magazine mounted on the trolley it grips the case. The trolley then moves to the left while the suction arm swings to the right and forces the lower edge of the case against the arresting edge 17.

Fig. 1 also shows the magazine 21 of the assembling machine and a roller conveyor 22 over which the cases, when filled, are removed.

The initial and various subsequent shapes of the case 16 are shown in Figures 14a-k. Each of the four walls, which for the body of the case, consists of a centre-piece 23 provided with movable flaps at both of its extremities. In this description the term "vertical flaps" means the flaps of the side walls of the case, while the "horizontal flaps" are fitted to the top and bottom walls of the case. Thus, when the case has been erected and is situated on the machine, the vertical flaps hinge about a vertical axis while the horizontal flaps hinge about a horizontal axis.

The front of the case is considered to be that part which is to slide over the magazine 21 of the assembling machine and must, therefore, be opened, whilst the back must be closed so that it may support the articles when the filled case is removed from the assembling machine and tilted backwards through 90°.

In the 2nd phase, see Figs. 3, 3a and 14c, the rear-most vertical flaps 24 are bent outwards by means of two arms 25 capable of partial rotation about spindles 26, the arms being operated by a link mechanism 27 actuated by a cam 28 on the common shaft 8. By reason of the shape of the cam 11, the trolley 3 remains stationary during this phase.

In the 3rd phase, see Figs. 4, 4a and 14d, the horizontal rear-most flaps 29 are folded in, that is brought into a vertical position. This is possible because during the preceding phase the vertical flaps 24 have been bent slightly outwards. The closed flaps 29 do not join, so that together they do not form a complete case side. The folding is performed by means of two arms 30 operated by a link mechanism 31 which is actuated by a cam 32 on the common shaft 8.

In the 4th phase, see Figs. 5, 5a and 14e, the vertical rear-most flaps 24 are folded over the horizontal rear-most flaps to close the back of the case. The width of flaps 24 is such that they join when closed. The flaps are closed by means of the arms 33 fixed to rods 34 which are partially rotated by a link mechanism 35 actuated by a cam 36 on the common shaft 8. The closed flaps are held in position by spring loaded elements (not shown) fitted to the trolley 3.

In the 5th phase, see Figs. 6, 6a and 14f, the right hand front vertical flap 37 is bent outwards in order to obtain an opening at the front of the case which, as the case is moved further to the right, slides over the extremity of the assembling machine magazine 21. The flap 37 is bent outwards by means of two arms 38 which are attached to a vertical spindle 39 which is rotated by a link mechanism 40 actuated by a cam 41. Though reference is made to a 4th and 5th phase these phases actually occur simultaneously.

At the completion of the 5th phase, the common shaft 8 has made one complete revolution, and any further rotation of the shaft would cause the erected carton 16 to be moved in line with the magazine 21 of the packing machine. This movement must not take place until the previously erected case, which is being filled whilst the case 16 is being erected, has been ejected from the magazine 21 of the assembling machine. The rotation of the common shaft is stopped by disengaging the clutch 9.

The clutch 9 has a driving member 42 to which is

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bolted by means of bolts 45 a ring 43 provided with a plurality of semi-circular milled recesses 44 on its internal circumference. The driven member comprises a flange 46 to which is bolted a ring 47 by means of bolts 48. A rod 49 is rotatably attached to the flange 46. One end of the rod 49 is secured to a plate 50 and the other end is specially shaped so that it can engage a milled recess 44 in the ring 43. Thus, when the rod 49 is turned clockwise through a small angle it engages a milled recess 44 thereby locking the driving and driven members of the clutch together. The clutch is normally held engaged by means of a spring 51, one end of which is attached to the plate 50, whereas its other end is attached to the flange 46. The spring pulls the plate 50 so as to turn the rod 49 clockwise. The function of the ring 47 is to prevent the rod 49 being forced out of engagement with the milled recess 44 and to act as a support for the rod. The movement of the plate 50 is limited by means of stops 52. The plate 50 has attached to it a roller 53.

Referring to Figs. 1 and 7, the lever 54 has one end hinged to the framework, the other end being connected to a piston which moves in a cylinder 55 connected to a vacuum pipe 56. A pawl 57 is attached to the lever 54, the arrangement being such that when the lever is in its normal (lower) position the pawl 57 is in the path of the roller 53, see Fig. 15a. Thus, as the clutch continues to be driven clockwise the roller 53 will hit the pawl 57 thereby turning the rod 49 so as to disengage the clutch. As the clutch is disengaged, the machine is brought to rest.

The article assembling machine is, however, continuing the insertion of layers of articles into the magazine 21 over which is situated the previously erected case. The completion of the stacking of a layer of articles forces a small counterweight 58, which rests on the uppermost article of the layer, upwards. The counterweight 58 is fixed to one end of a lever 59 which can swivel about a fulcrum 60 so that when the weight 58 is raised the other end 61 is lowered into the path of a constantly reciprocating lever 62. The fulcrum 60 is secured to a pusher plate 63 so that when the end 61 of lever 59 comes into contact with the constantly reciprocating lever 62, the latter pushes the lever 59 and, with it, the fulcrum 60 and the pusher plate 63. Thus, every time the counterweight is raised, a layer of stacked articles is inserted into the magazine 21 and the entire contents of the magazine and the case are shifted to the left through a distance equivalent to the thickness of one article, see Figs. 9-13. As more layers are inserted into the magazine the case is pushed further out of the magazine until finally, see Fig. 13, it is ejected therefrom. As the filled case is being ejected, it tilts over a roller 64 whilst falling on to the roller conveyor 22.

In contact with the back of the case is an arm 65 which swivels about a fulcrum 66 and has a counterweight 67 attached to the end remote from the case, see Figs. 8-13. As the case is pushed out of the magazine 21, it causes the arm to swivel anti-clockwise about the fulcrum, the arm being kept in contact with the carton by the counterweight 67. A pawl 68 is attached to the arm 65 in such a manner that it operates a valve 69 of a vacuum system, which is connected to the pipe 56, when the filled case is finally ejected from the magazine of the packaging machine, see Fig. 13. This operation of the valve 69 raises the lever 54 thereby engaging the clutch 9.

The reciprocating trolley 3 now moves to the right and the rod 70 attached to it pushes the ejected case further along the roller conveyor on to a conveyor belt which carries it away, at the same time placing the newly erected case in line with the magazine 21 of the assembling machine, see Fig. 7. This movement of the trolley to the right is the start of a new cycle and the suction arm 12 takes a flat folded case from the case magazine 6. During the movement of the case to the right, the upper horizontal front flap 71 is slightly lifted by an arm 72

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fitted to the structure, as shown in Figs. 8, to permit the case to slide sideways along the magazine 21.

A cam, not shown, on the common shaft 8 now operates for a short period a valve, not shown, in a vacuum system which causes the arm 65 to turn clockwise to push the newly erected case over the magazine of the assembling machine; see Figs. 8 and 9. On releasing the vacuum, the arm 65 at first stays in the position shown in Fig. 9; but it now exerts only a slight pressure on the carton by means of the counterweight 67, thereby enabling the case to be pushed back gradually as it is being filled, see Figs. 10-13, without causing injury to the articles in the case.

We claim:

1. A case erecting machine comprising in combination 15 a trolley, means for reciprocating the trolley, a case magazine mounted on the trolley, an arresting edge mounted on the trolley and pick-up means disposed adjacent one limit of the path of reciprocatory motion of the trolley for taking a flat case from the case magazine and forcing it against the arresting edge to erect the case. 20

2. A case erecting machine comprising a trolley, means for reciprocating the trolley, a case magazine mounted on the trolley, an arresting edge, a suction pickup arm mounted for oscillatory movement about an axis at right angles to the direction of reciprocatory movement of the trolley, and means for oscillating a pickup arm whereby the pickup arm is adapted to pick up a flat case from the case magazine and force it against the arresting edge to erect the case, said arresting edge being mounted on the trolley. 25

3. A case erecting machine comprising in combination a trolley capable of being oscillated, a two section lever connected by a pin joint, one end of the lever being connected to the trolley, the other end of the lever being rotatably connected to a stationary spindle mounted at right angles to the direction of movement of the trolley, a shaft, a first cam mounted on said shaft for actuating the section of the lever between the pin joint and the stationary spindle, a case magazine mounted on the said trolley, an arresting edge mounted on the said trolley, a suction pick-up arm capable of oscillating about an axis at right angles to the direction of movement of the trolley, a second cam mounted on said shaft, a cam follower cooperating with the second cam, and a link mechanism connected to the cam follower and the suction pick-up arm for actuating the suction pick-up arm. 30

4. A case erecting machine comprising in combination a trolley capable of being oscillated, a two section lever connected by a pin joint, one end of the lever being connected to the trolley, the other end of the lever being rotatably connected to a stationary spindle mounted at right angles to the direction of movement of the trolley, a shaft, a first cam mounted on said shaft for actuating the section of the lever between the pin joint and the stationary spindle, a case magazine mounted on the said trolley, an arresting edge mounted on the said trolley, a suction pickup arm capable of oscillating about an axis at right angles to the direction of movement of the trolley, a second cam mounted on said shaft, a cam follower cooperating with the second cam, and a link mechanism connected to the cam follower and the suction pick-up arm for actuating the suction pick-up arm, a vacuum supply line to the suction arm, a vacuum valve in said supply line, and a third cam mounted on the said shaft for actuating the vacuum valve. 35

5. In a packaging machine including a case erecting machine and an article assembling machine of the type having a magazine which has an open entry end and opposite thereto an open exit end, and pusher means for intermittently pushing articles into the entry end of the magazine, the invention comprising a detecting device for detecting the ejection of a filled case from the magazine, and means responsive to said detecting device for pushing an erected case over the exit end of the magazine. 40

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6. In a packaging machine including a case erecting machine and an article assembling machine of the type having a magazine which has an open entry end and opposite thereto an open exit end, and pusher means for intermittently pushing articles into the entry end of the magazine, the invention comprising a detecting device for detecting the ejection of a filled case from the magazine, means responsive to said detecting device for substantially positively pushing an erected case over the exit end of the magazine, and means for exerting a yieldable force against said carton to keep it in contact with the articles pushed out from the exit end of the magazine. 45

7. In a packaging machine, an article assembling machine of the type having a magazine which has an open entry end and opposite thereto an open exit end, pusher means for intermittently pushing articles into the entry end of the magazine, a shaft for actuating the pusher means, means for continuously rotating the said shaft, and a case erecting machine including case erecting members, a shaft for actuating the case erecting members, a one revolution clutch having the driven member coupled to the case erecting machine shaft and the driving member coupled to the assembling machine shaft, a detecting device for detecting the ejection of a filled case from the magazine, means responsive to said detecting device for engaging the clutch, means actuated by the case erecting machine shaft for substantially positively pushing an erected case over the exit end of the magazine, and means for exerting a yieldable force against said case to keep it in contact with the articles pushed out from the exit end of the magazine. 50

8. In a packaging machine including a case erecting machine of the type having case erecting members and a shaft for actuating the case erecting members, a one revolution clutch having a driving member and a driven member, the driven member being coupled to the said shaft, means for continuously rotating the driving member, and an article assembling machine of the type having a magazine which has an open entry end and opposite thereto an open exit end, and pusher means for intermittently pushing articles into the entry end of the magazine, the invention comprising a pivoted arm having one end arranged for contacting the case, vacuum means responsive to the said shaft for actuating the arm for pushing an erected case over the exit end of the magazine, a counter-weight attached to the other end of the arm for exerting a yieldable force against the case to keep it in contact with the articles pushed out of the exit end of the magazine, and means attached to the said arm for engaging the clutch when the arm has been displaced by an ejected case. 55

9. In a packaging machine comprising in combination an article assembling machine of the type having a magazine which has an open entry end and opposite thereto an open exit end, pusher means for intermittently pushing articles into the entry end of the magazine, a shaft for actuating the pusher means, and means for continuously rotating the said shaft, and a case erecting machine of the type having case erecting members and a shaft for actuating the case erecting members, a one revolution clutch having the driven member coupled to the case erecting machine shaft and the driving member coupled to the assembling machine shaft, a pivoted arm having one end arranged for contacting the case, first vacuum means responsive to said case erecting machine shaft for actuating the arm for pushing an erected case over the exit end of the magazine, a counter-weight attached to the other end of the arm for exerting a yieldable force against the case to keep it in contact with the articles pushed out of the exit end of the magazine, second vacuum means for engaging the clutch, a valve for controlling the second vacuum means, and a pawl attached to the said arm for operating the valve to engage the clutch when the arm has been displaced by an ejected case. 60

10. A case erecting machine comprising in combination a trolley forwardly and rearwardly, means for reciprocating the trolley, a case magazine mounted on the trolley, an arresting edge mounted on the trolley and pick-up means disposed adjacent one limit of the path of reciprocatory motion of the trolley for taking a flat case from the case magazine and forcing it against the arresting edge to erect the case. 65

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cating the trolley, a magazine mounted on the trolley for carrying flat cases at an angle to the horizontal, pick-up means disposed adjacent the forward limit of the path of reciprocation of the trolley including an arm mounted for simple oscillatory movement about an axis at right angles to the direction of reciprocatory movement of the trolley, suction means at the free end of said arm, means for oscillating the arm to dispose the arm rearwardly substantially normal to the flattened cases and to dispose the suction means in the plane of the flat cases in the magazine and to swing the suction means downwardly and forwardly through an arc to erect the flat case engaged by the suction means, and an arresting edge against which the lower forward edge of the case being erected is abutted as said arm is swung through the erecting arc.

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