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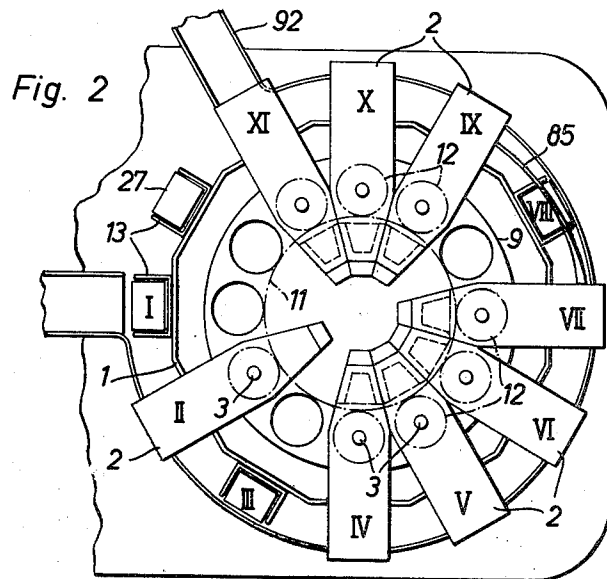
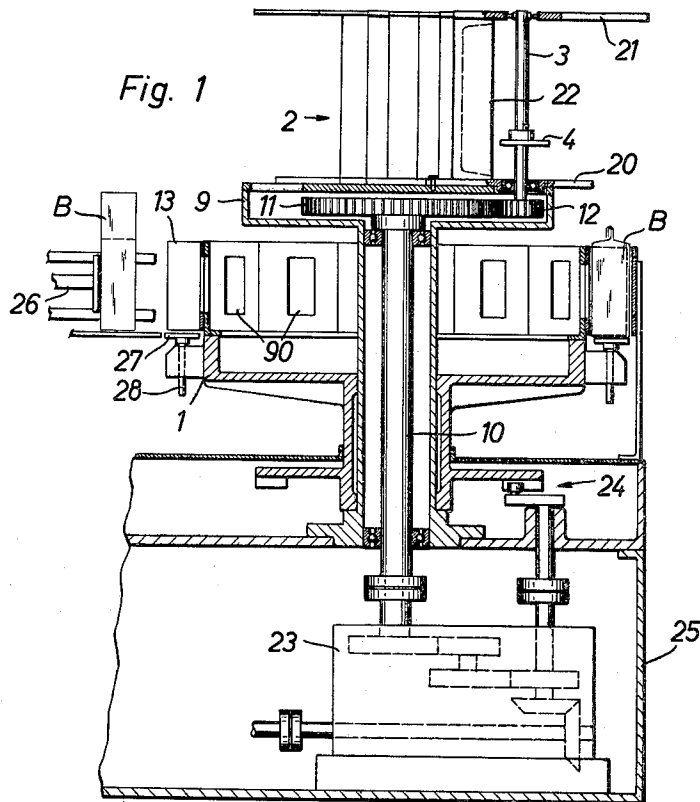
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BAG CLOSING MACHINES

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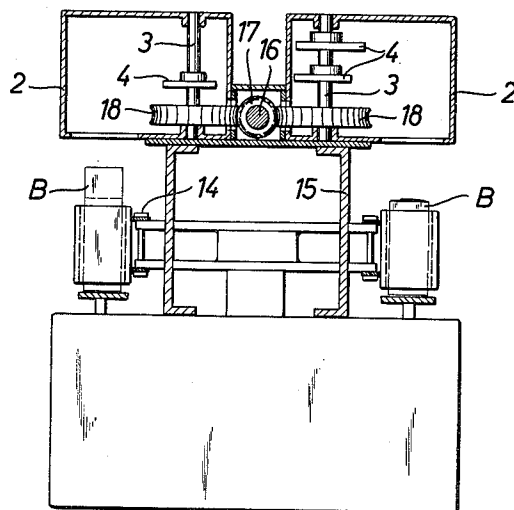


Fig. 3

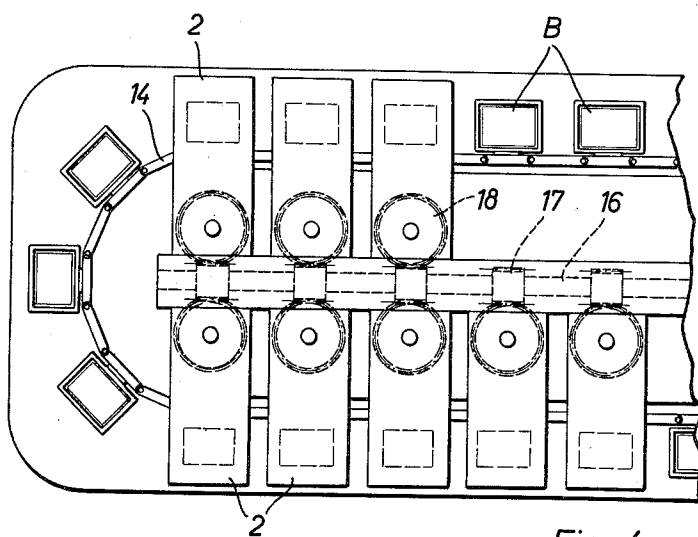


Fig. 4

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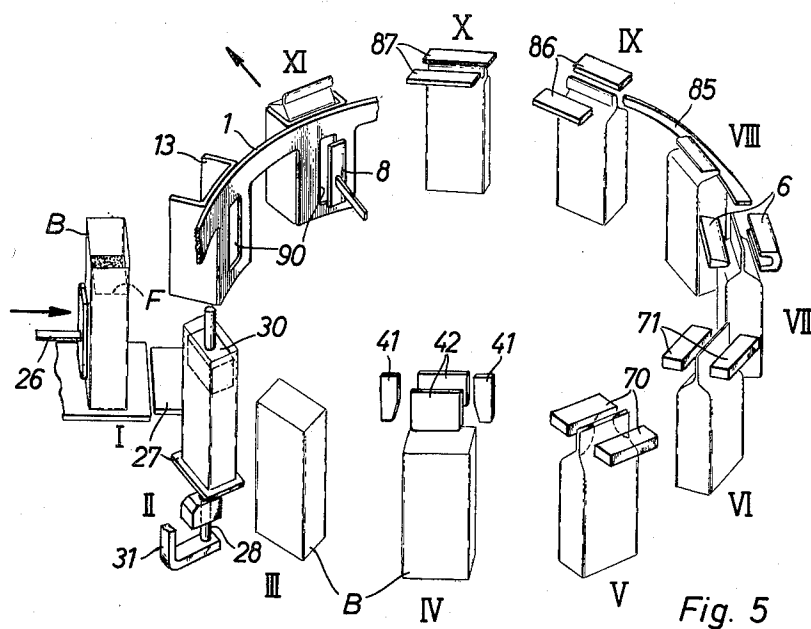


Fig. 5

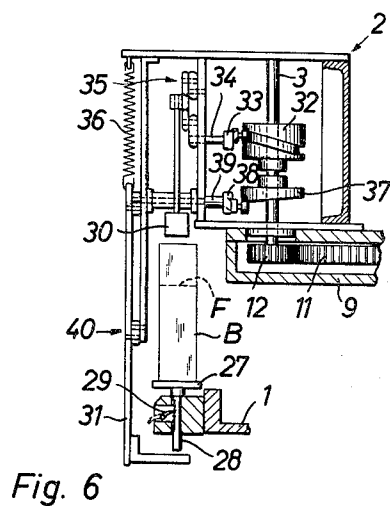


Fig. 6

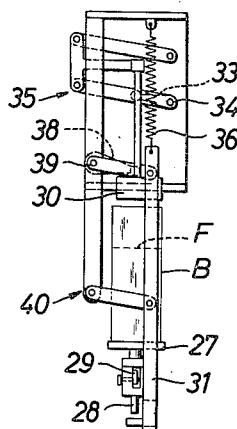


Fig. 7

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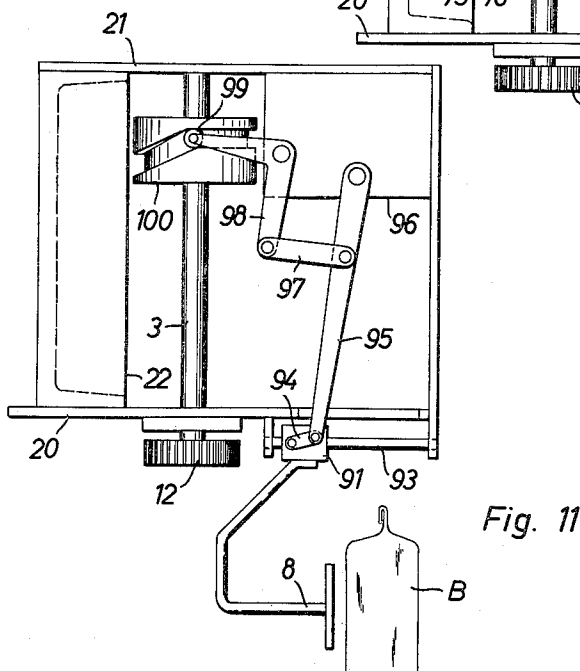
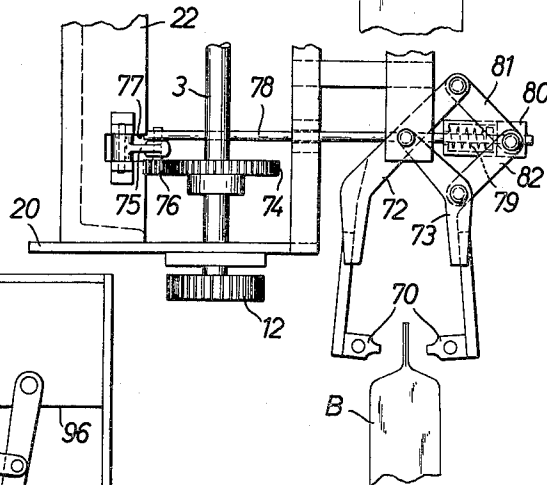
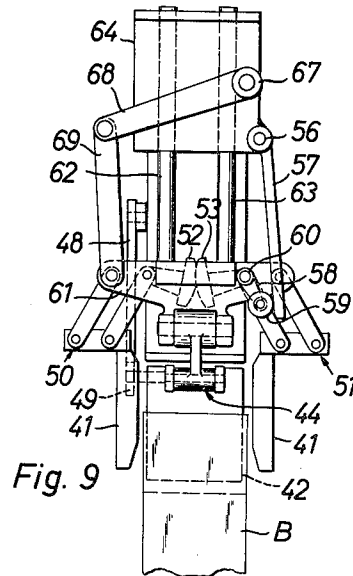
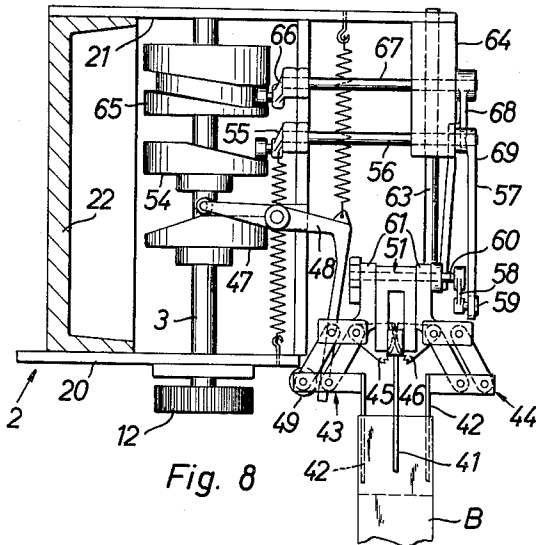
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BAG CLOSING MACHINES

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4 Claims. (Cl. 53-201)

This invention relates to a bag closing machine in which bags are fed by a conveyor device in succession to various folding and closing tools arranged on successive working points in the machine.

In accordance with my invention, the tools arranged at the said working points, together with their driving elements, are combined at each working point into replaceable tool sets or units (hereinafter referred to simply as "sets") which are arranged above the said conveyor device, and are adapted to be driven by means of a centrally arranged driving shaft which is common to all the sets. To make provision for simple replacement of the said tool sets, and to achieve a readily supervised but nevertheless compact construction, the control cams of each tool set are mounted on a control member constituted by the vertical control shaft which is disposed above the tools of the set and is coupled to the said common driving shaft.

This arrangement of the tools and their control elements has the advantage that when the machine is to be utilized for a different operation which is possible within a very wide range, it is only necessary to change the corresponding sets at the particular working points which have to be changed, and this is possible within a short period of time. The control elements are readily accessible which is important in the setting up of the machine. The arrangement of the control cams on vertical shafts has the advantage that more control cams can be included per set than is the case where the shafts are arranged horizontally. Another important feature of the invention resides in arranging each tool set including its driving elements in a separate closed housing or casing which is replaceable as a unit.

Two embodiments of the invention are illustrated in the accompanying drawings, in which:

FIG. 1 is a cross-section through one embodiment of the bag closing machine,

FIG. 2 is a plan view of the bag closing machine shown in FIG. 1,

FIG. 3 is a cross-section of another embodiment of the bag closing machine,

FIG. 4 is a partial plan view of the bag closing machine according to FIG. 3,

FIG. 5 is a diagrammatic illustration showing the manufacture of the bag closure,

FIG. 6 is a side view of a device for lifting the bags,

FIG. 7 is a front view of the device shown in FIG. 6,

FIG. 8 is a side view of a folding apparatus,

FIG. 9 is a front view of the folding apparatus shown in FIG. 8,

FIG. 10 is a side view of a part of a heat-sealing device,

FIG. 11 is a side view of an ejecting device.

The embodiment illustrated in FIGURES 1 and 2 relates to a bag closing machine with working stations I—XI arranged in a circle and comprising an intermittently rotatable conveyor wheel 1 which is adapted to convey the filled bags B within cups 13 in succession to various folding and closing tools. A machine of this character may, for example, be part of a machine for producing, filling and closing bags or cartons.

The tools at each station are combined into sets and are arranged in casings 2 which are interchangeably attached to the frame 9 of the machine. Each of the casings 2

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comprises a base plate 20, a head plate 21, and a web 22. The casings have substantially the same dimensions so that they may be used at any working station of the machine. In addition to the tools and their driving elements (such as levers) the control cams are disposed in the casings 2, and are secured to a control member constituted by a vertical control shaft 3 rotatably mounted in the base plate 20 and the head plate 21. Furthermore, the control shafts 3 are identically positioned in all of the casings 2.

The drive of all tool sets is from a common, centrally arranged vertical shaft 10 having a gear wheel 11 secured to the upper end thereof and meshing with gear wheels 12 mounted on the individual control shafts 3. The vertical shaft 10 has imparted thereto a uniform rotary motion from a gearing 23 disposed in a sub-frame 25 of the machine, said gearing also initiating in combination with a Geneva motion the intermittent movement of the conveyor wheel 1.

The operation of the bag closing machine is diagrammatically illustrated in FIG. 5. A filled bag B is delivered to the machine at station I by means of a pushing member 26. The pushing member displaces the bag B into a cup 13 of the conveyor wheel 1 the bottom of which constitutes a supporting plate 27. After completion of one conveying step of the conveyor wheel 1, the filling level F of the bag B will be adjusted at station II. For this purpose, a device shown in FIGS. 6 and 7 is provided. This device has tools comprising a plunger 30 and a lifting rod 31 which together with their control elements are arranged within a casing 2. First, the plunger 30 controlled by a cylindrical cam 32, lever 33, shaft 34 and a linkage 35 will be lowered into the bag up to a fixedly adjusted level. Thereupon, the rod 31 controlled by a disc-shaped cam member 37 through a lever 38, a shaft 39 and a linkage 40 will lift, by means of the tension force of a spring 36, the supporting plate 27 fixed to the supporting rod 28 to the extent to which the disc-shaped cam 37 permits movement of the said linkage 40. When the filling level F of the filling material within the bag B reaches the underside of the plunger 30, the lifting movement of the bag B will be arrested, the rod 31 will be lowered again, and accordingly the plunger 30 will be lifted. The adjusted filling level of the bag B, however, will be maintained by a pawl 29 engaging the teeth of the supporting rod 28 thereby locking it. At station III the bag B is not shown to undergo any operation so that a tool set will not be needed at this station.

The first step of the bag closing operation will then be effected at station IV as follows. The mouth of the bag is flattened so that the two narrow sides of the mouth will form inwardly directed folding flaps. Pairs of folding members 41 and 42 are provided for this purpose as shown in FIGS. 8 and 9. These pairs of folding members are so controlled that the folding members 42 enter the open bag B. As the folding members 41 urge the narrow sides of the unfilled mouth bag end inwardly, said folding members 42 will simultaneously be moved towards each other. The folding members 42 are suspended from parallelogram linkages 43, 44 interconnected by means of tooth segments 45, 46. The folding members 42 are controlled from a disc-shaped cam 47 by means of a bell-crank 48 being engaged by a roller 49 attached to parallelogram linkage 43. The folding members 41 are similarly suspended from parallelogram linkages 50, 51 interconnected by toothed segments 52 and 53. The said folding members 42 are controlled from a disc shaped cam 54 by means of a lever 55, a shaft 56 and a lever 57 which is engaged by a roller 59 provided on a lever 58. The lever 58 carries a pin 60 to which is secured a lever of the parallelogram linkage 51.

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In order to permit the folding members 41, 42 to be lowered in position adjacent the bag mouth and to be lifted again after completion of the folding operation, their parallelogram linkages 43, 44 and 50, 51, respectively, are mounted on a head member 61 which is attached to two vertically movable rods 62, 63 guided within a bracket 64. Lowering and lifting of the head member 61 is controlled by a cylindrical cam 65 by means of a lever 66, a pin 67 and a linkage 68, 69 of which link 69 is articulated to the head member 61.

At the stations V and VI, the folded bag mouth is tightly closed by heat-sealing. For this purpose, pairs of heat-sealing pads 70 and 71 are provided which are secured to pivotally mounted levers 72, 73 (FIG. 10). The heat-sealing pads 70 pivot in a direction towards one another in response to cam disc 74. The periphery of this cam disc 74 is engaged by a roller 76 mounted on a lever 75. The lever 75 is pivotally mounted on the web 22 of the casing 2 and projects through a recess 77 of the web 22. The lever 75 in addition is pivotally connected at its free pivotal end to a rod 78 which is connected by means of a spring 79 to a block 80. The block 80 has articulated thereto two lugs 81, 82 which are also connected with the levers 72, 73 so that, upon withdrawal of the rod 78, the heat-sealing pads are pressed towards each other under the pressure of the spring 79 arranged therebetween, thereby heat-sealing the bag opening. The sealing pads 71 are operated in the same manner.

At the station VII, the heat-sealed bag closure is folded along its length by means of folding-pincers 6. The folding pincers 6 are actuated by means of a similar device as shown in FIG. 10 and described hereinbefore for the heat-sealing pads 70. During the further conveyance of the bag B to station IX, the folded bag closure will be, as shown in FIG. 5, turned vertically by means of a curved stationary guide bar 85 and thereupon heat-sealed by pairs of heat-sealing pads 86 and 87 at the stations IX and X.

After completion of the bag closure, the bag is removed at station XI from the cup 13 of the conveyor wheel 1. For this purpose, a device as shown in FIG. 11 is provided. This device has a head member 91 carrying a pushing member 8 which is moved from the center of the conveyor wheel 1 radially outwards thereby penetrating through a recess 90 of the conveyor wheel 1 and of the cup 13 to push the bag B onto a discharge conveyor 92 (FIG. 2) of the machine.

In order to permit reciprocation of the pushing member 8, the head member 91 is slidably mounted on a horizontal rod 93 and articulated by means of a latch 94 to a lever 95. The lever 95 is pivotally mounted on a plate 96 of the casing 2 and connected by means of a member 97 to a bell-crank 98 which is likewise pivotally mounted on the plate 96 and controlled by means of a roller 99 and a cylindrical cam 100.

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In the embodiment illustrated in FIGURES 3 and 4, the casings 2 for the tool sets are located side by side on the machine frame above the straight sections of a conveyor device, for example a conveyor chain 14. The control shafts 3 and the control cams 4 thereon are driven by a horizontal shaft 16 having a plurality of worm wheels or helical wheels 17. These latter wheels engage with worms or helical wheels 18 secured to the control shafts 3. The structure of the individual tool sets corresponds to that of the first embodiment described above. In the embodiments described hereinbefore, it is also possible to provide the free stations with similar tool sets which are also accommodated in casings 2. The adaptation of the machine for various operations is effected in such a manner that the casings 2 together with the corresponding tool sets are simply removed from the machine and replaced by others.

What we claim is:

1. A bag closing machine having several working stations, said machine comprising a conveyor device for transporting a bag to the working stations, a tool at each of the working stations adjacent the conveyor device, each of said tools including drive and control members in operative association for controllably driving each said tool, said control member being identically positioned in each of said tools, and drive means adapted for the connection with the control member of each of said tools to drive the same, each of said tools being independent of one another and interchangeable by virtue of the identical positioning of the control members in the tools.

2. A machine as claimed in claim 1 wherein said control member of each of said tools includes a vertical drive-shaft and operating cams on said driveshaft, said driveshaft being adapted for attachment to said drive means.

3. A machine as claimed in claim 2 wherein the tools are provided in a circular arrangement having a determinable center, said drive means including a vertical drive-shaft at said center, said drive members of the tools being adapted for connection with said driveshaft.

4. A machine as claimed in claim 1 wherein each of said tools further includes a casing of determinable size, the casing of each of said tools being of substantially the same size.

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