Nov. 3, 1959 S. J. GARTNER 2,911,114

CATHODE FEED

Filed May 23, 1957 4 Sheets-Sheet 1

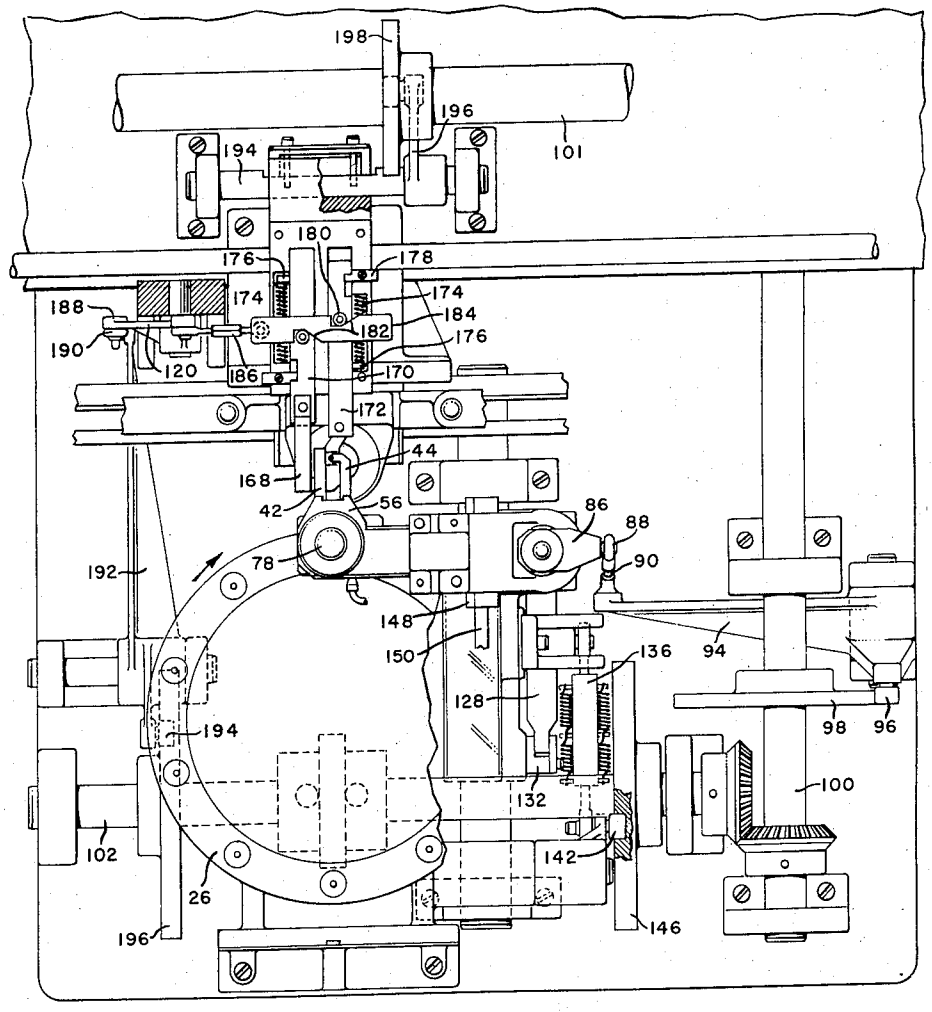


FIG-2

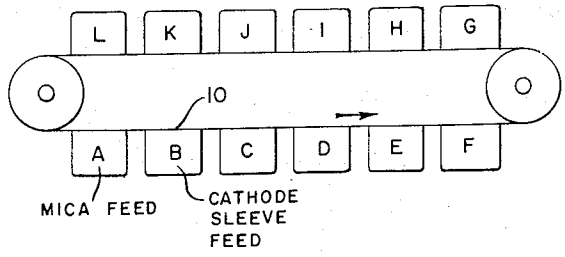


FIG-1

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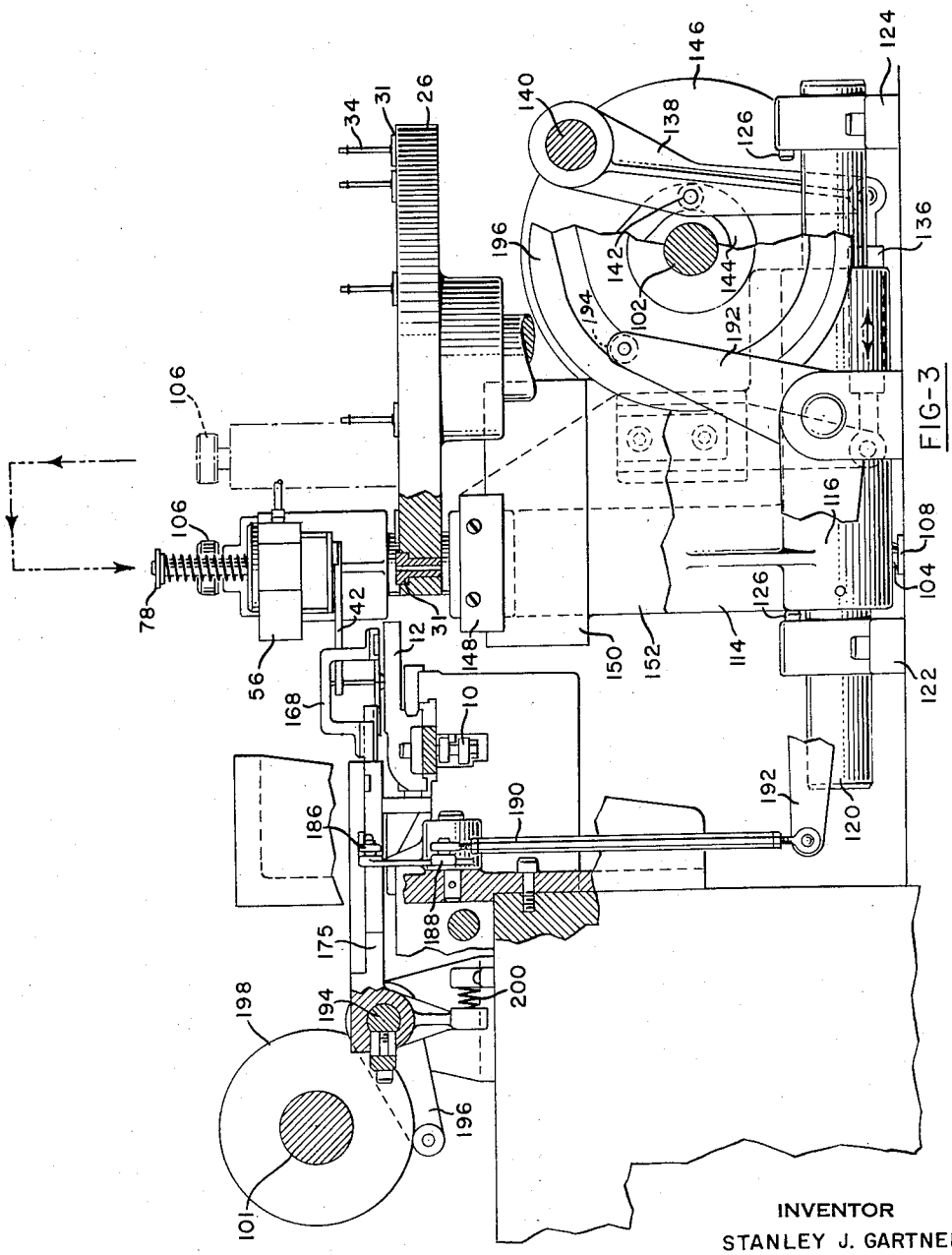


FIG-3

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CATHODE FEED

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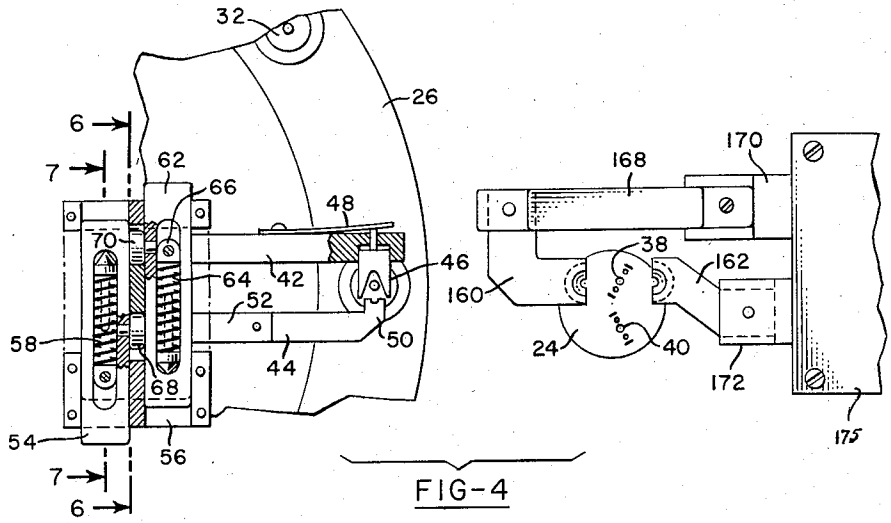


FIG-4

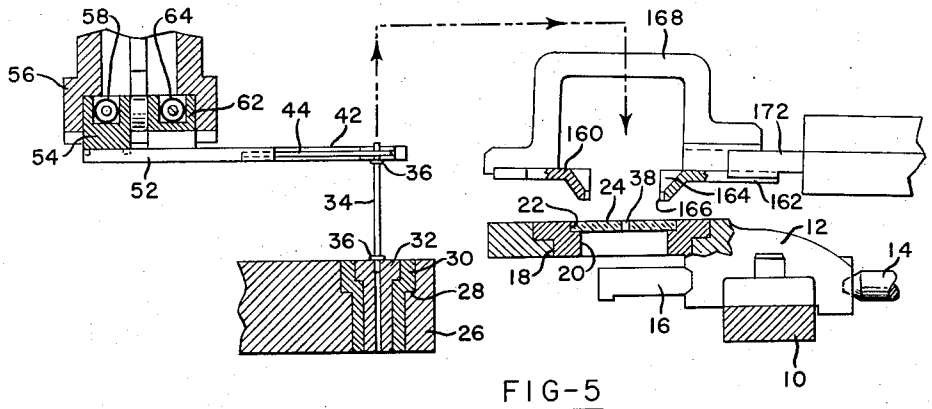


FIG-5

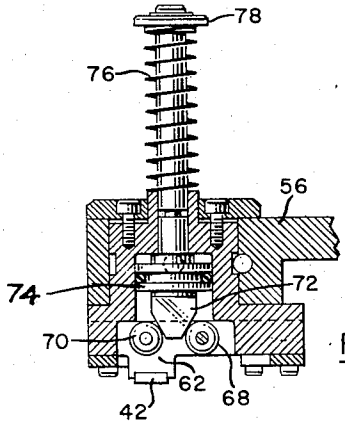


FIG-6

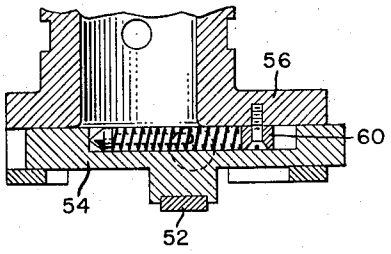


FIG-7

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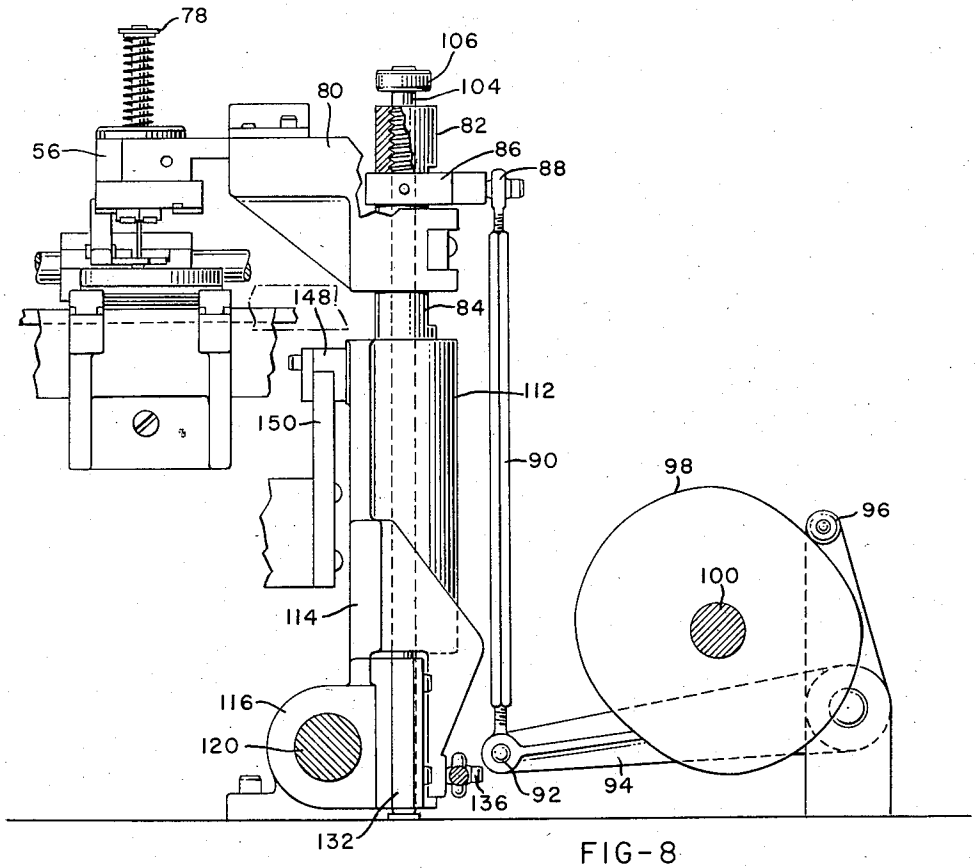


FIG-8

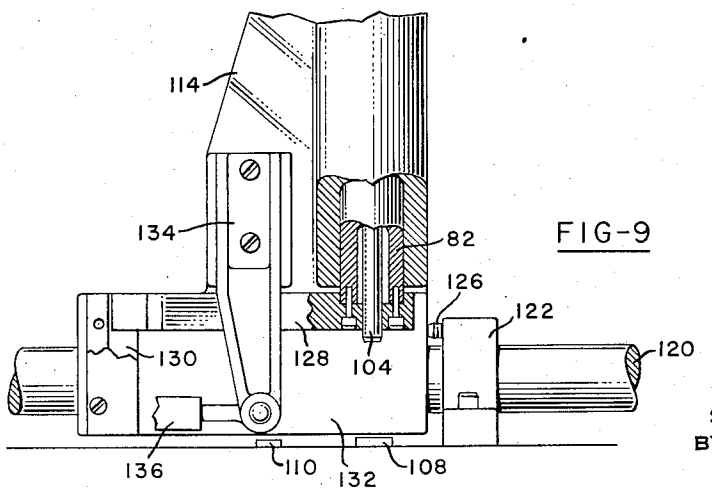


FIG-9

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CATHODE FEED

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Application May 23, 1957, Serial No. 661,097

3 Claims. (Cl. 214—1)

The invention relates to means for feeding individual cathode sleeves from an operator loaded magazine to its proper position in an insulating spacer as part of the assembly of an electron tube.

An object of the invention is to provide mechanism which shall be capable of rapid operation, with precision as to insertion of the sleeve within the insulating spacer. It is a further object of the invention to provide novel precision transfer mechanism particularly where the delivery and receiving stations are at different elevations. Other objects will be apparent upon consideration of the specification.

The invention is here exemplified as applied to the insertion of a cathode sleeve in an insulator such as mica, both forming part of a duotriode such as a type 6SN7 tube.

The invention will be understood by considering the following specification when taken in conjunction with the accompanying drawings in which

Fig. 1 is a diagrammatic view of the machine layout indicating the cathode sleeve feed station B particularly described and claimed herein.

Fig. 2 is a plan view of the mechanism at the cathode sleeve feed station with parts broken away in order to show operative portions of the machine.

Fig. 3 is an elevational view of the machine with parts broken away.

Fig. 4 is a detail view showing the mechanism which engages the sleeve to transfer the sleeve from a magazine to the mica and means for guiding the sleeve into place in the mica.

Fig. 5 is a vertical section of the mechanism of Fig. 4.

Fig. 6 is a section on the line 6—6 of Fig. 4.

Fig. 7 is a section on the line 7—7 of Fig. 4.

Fig. 8 is an elevation of some of the mechanism shown in Fig. 2 and

Fig. 9 is an enlarged view of a portion of the mechanism shown in Fig. 8 taken at right angles to that figure.

Referring to the figures in greater detail, in Fig. 1 there is diagrammatically illustrated a machine for automatically assembling mounts at successive stations indicated as A, B, C, etc., the machine comprising an endless carrier 10 having support blocks 12, see Figs. 3 and 5 spaced therealong, which blocks are indexible to the various stations. A block centering and holding device in the form of a pin 14 at each station engages a recess in the back of the block as it is moved by the conveyor to a station to hold the same against a fixed abutment block 16 while it is at any of the stations. Since the matter just described is not material to the understanding of the invention, except as set forth, no further details need be described.

The block 12 is provided with a circular flanged opening 18 within which is suitably secured a mica holding ring 20 provided with a seat 22 on which micas 24 are placed at the preceding station A. For the purposes of this disclosure the micas could have been placed in the rings, in properly orientated position, by hand.

At the cathode feed station there is a rotary disc type magazine 26 provided with flanged seats 28, see Fig. 5, for securely holding bushings 30 in turn securely seating an axially perforated cathode sleeve holder 32. In a modified form of holder shown in Fig. 3, the elements 30 and 32 are replaced by a single holder 31. An operator places cylindrical cathode sleeve 34 in these holders. Surrounding the sleeves are integral beads 36, at least at the lower ends thereof, which serve to limit the downward motion of the sleeves in the holders as well as in the micas. The sleeves are coated with emissive material between the beads. The turret is indexed in synchronism with the indexing of the conveyor so that the proper transfer of sleeve from magazine to a prepared punched out hole, as 38, in mica 24 may be effected. Any conventional form of drive for the conveyor and turret may be employed, as a drive shaft common to the two and driving two Geneva mechanisms or equivalent, one for indexing the conveyor and the other for indexing the magazine disc. In the case of a twin cathode structure, the following station C would feed a cathode sleeve to the companion hole 40.

To transfer a sleeve from a holder when in the indexed position to the appropriate hole in the mica, there is provided a pair of fingers 42 and 44, see Figs. 4 and 5, the finger 42 at its free end having a seat for a clamp jaw 46 pressed by a spring 48 toward the companion jaw 50, both jaws being suitably configurated to fit about the top of cathode sleeve 34 and above the bead 36. The finger 44 and jaw 50 are thin as shown in Fig. 5 and when grasping a sleeve the jaw 50 partially enters a horizontal slot in the jaw 46. The finger 44 is fixedly mounted in an arm 52 in turn affixed to a slide bar 54 slidable in a way in a transfer head 56 and urged by a spring 58 to move the jaw 50 to cathode sleeve engaging position, the spring, see Fig. 7, reacting against the end of a slot in the bar 54 and an abutment block 60 fixed to the transfer head 56. The finger 42 is fastened to a slide bar 62 also mounted in a way in the head 56, this bar urging the jaw 46 to cathode sleeve engaging position by means of a spring and block arrangement 64 and 66, in a manner similar to the spring and block 58, 60. Means are provided to separate the jaws against the action of the springs comprising a roller 68 rotatively mounted on a stub shaft extending laterally from the side of slide bar 54, a second roller 70 similarly mounted on slide bar 62 and a wedge 72. The wedge is on the lower end of a piston 74 within the head and is normally held in retracted inoperative position by a spring 76 reacting between a part of the head and an abutment 78 on the piston rod of the motor. Fluid pressure applied to the motor at an appropriate time and under control of cam mechanism on the machine will force the wedge between the rollers and effect opening of the jaws. The spring pressure applied to the jaws by springs 48, 58 and 64 is light enough to avoid distortion of the cathode sleeve.

Means are provided to move the head vertically to lift the sleeve out of the carrier in the magazine and to move the head downwardly to place the sleeve in the hole 38 in the mica and also to shift the head laterally between the magazine and the mica stations. These means will now be described.

The head 56, see Fig. 8, is adjustably mounted in an arm 80 fixedly mounted on a vertical reciprocatable hollow shaft 82, and shaft 82 being provided with a flat portion 84 to prevent rotation of the arm 80 and to permit up and down adjustment of the arm 80 on the shaft. To move the shaft vertically there is fixed thereto a collar 86 connected by a universal joint 88 with an extensible link 90, in turn connected by a universal joint 92 to a bell crank lever 94 pivoted to the base of the frame

and having a cam follower **96** riding on the face of a cam **98** fixedly mounted on a shaft **100**, see Fig. 2, driven from a main drive shaft **101** of the machine by conventional gearing, not shown, and geared by bevel gears to the counter drive shaft **102** and which is connected to the turret magazine **26** to drive the same intermittently by a barrel cam shown in dotted outline. Within the hollow shaft **82** is a stop rod **104** having a hand adjustment knob **106**, the lower end of the rod coming into engagement with one of a pair of stops **108** or **110** as will be described, dependent on whether the sleeve grasping jaws are down above the magazine or down above the mica. The rod **104** at the upper end is screw threaded into the shaft to facilitate vertical adjustment of the stop rod and therefore adjustment of the limit of downward motion of the jaws.

The entire assembly of transfer mechanism so far described is reciprocated laterally between mica and magazine stations by the following mechanism: The shaft **82** is mounted for reciprocation in a sleeve **112** integral with a planar vertical back **114** rising from an elongated horizontal shiftable elongated collar **116**. The elongated collar is fixed on a shaft **120**, see Fig. 3, slidable in bearings **122**, **124** fixed to the frame, each of the bearings being provided with an adjustable stop **126**. Fixed to the lower end of hollow shaft **82**, see Fig. 9, is a guide arm **128** whose free end rides in a vertical guideway **130** in an enlargement **132** to the right of bearing **116**, as viewed in Fig. 8, in order to prevent rotational movement of the shaft, head **82**, and sleeve grasping jaws about a vertical axis. To laterally shift the elongated collar and parts carried thereby, the back **114** has fastened thereto a drive plate **134** to the lower end of which is connected an extensible spring link **136** driven by a lever **138** mounted on a fixed shaft **140** and having a follower **142** riding in a cam groove **144** in a cam disc **146** fixed to shaft **102**. At the upper end of back **114** there is provided a guideway **148** embracing the upper end of a rail **150** fixed to a frame part **152**. The sliding of the shaft **120** in its bearings and the sliding of the guideway over the rail enforce the rectilinear translation of the sleeve engaging jaws between the magazine and the mica. Also looseness of parts is avoided, thereby assuring accurate handling of the sleeves.

The valve controlling cam, the cam **98** and the cam **146** are so positioned on their respective shafts and contoured to cause the jaws to properly pick up and transfer a sleeve from the magazine to the mica when the magazine and carrier blocks **12** for the mica have been properly indexed.

To further assist in locating the sleeve in the mica, a locating mechanism is located above the mica in the indexed position thereof. This mechanism, see Figs. 4 and 5, comprises a pair of guide funnel fingers **160**, **162** each provided at their ends with semiconical walls **164** tapering downwardly and an opening **166** at the bottom of each of the walls. These fingers approach the bottom of a cathode sleeve and move downwardly with the sleeve to locate the sleeve exactly in the opening **38** of the mica, when the jaws **46**, **50** bring a sleeve over and above the mica and move the sleeve downwardly.

The finger **160** is affixed to an arched member **168** in turn connected to a bar **170**, while the finger **162** is affixed to a bar **172**. The arched bar allows for indexing movement of sleeve loaded micas. The bars are reciprocated in opposite directions to engage a sleeve, or to release the sleeve. The bars are urged to sleeve engaging position, see Fig. 3, by springs **174** each reacting between an oscillatable slide **175**, as will be described, and a lug **176** projecting from the respective bar. The bars are limited in their motion in slideways in the slide by stop lugs **178** cooperating with recesses in the bars. To move the bars so that the funnel sections recede from each other, there is provided a pair of cam followers **180**, one on each of the bars, these riding on oppositely inclined tracks **182** on a cam bar **184** so that as the cam bar is shifted to the left in Fig. 2, the funnel sections will spread apart. To move the bar **184**, there is provided a link **186**, see Fig. 3, connected by a bell crank lever **188** to a vertical link **190** extending downwardly to a cam operated lever **192** pivoted intermediate its ends to the frame and having a cam follower **194** riding in a groove in the side of a cam disc **196**. To effect the oscillatory up and down movement of the funnel fingers, the slide **175** is fastened at its rear end, see Fig. 2, to an oscillatable shaft **194** mounted in bearings on top of the machine, said shaft being oscillated by a crank arm **196** fixed to the shaft **194** and having a cam follower at its free end riding on the periphery of cam disc **198** fixed on the main shaft **101** of the machine. A spring **200** normally maintains contact of the follower on arm **196** against the cam.

What is claimed is:

1. In an article transfer device, fixed stops on the device, a pair of article grasping jaws, means mounting the jaws for movement toward and from each other comprising parallel oppositely movable bars having closely spaced faces, opposed support means for the jaws mounted on said bars at right angles thereto, said bars having cam follower rollers on the spaced faces, a cam bar movable in between the rollers for spreading them apart, resilient means urging the cam bar to non-roller engaging position, a motor for actuating the cam bar to roller spreading position, and spring means, one for each bar, nesting in the bars and acting on the bars and against said fixed stops to move the rollers against the cam bar and to urge the jaws to article engaging position.

2. Means for transferring an article from one location to a second location laterally displaced therefrom and at a different elevation, comprising a hollow shaft, an arm mounted on the shaft, jaws laterally movable toward and away from each other mounted by said arm and adapted to grasp an article therebetween, means for raising the shaft and permitting it to lower, shiftable support means for the shaft for enabling the shaft to be moved laterally from one position whereat an article is grasped by the jaws to another position whereat the jaws will release the article, a vertically adjustable stop rod traversing the shaft and extending therebelow, stop blocks of different height on the machine below the stop rod, one each in each of the lateral positions of the shaft, means for operating the jaws, and means for laterally shifting the shaft.

3. Means for transferring an article from one location to a second laterally displaced location comprising a frame, grasping jaws and means for operating them, means for raising and lowering the jaws comprising a laterally displaceable and vertically reciprocatable shaft, means for vertically displacing the shaft, means for mounting the shaft for lateral displacement comprising a vertical elongated sleeve, a planar vertical back supporting the sleeve, a horizontal shiftable structure elongated in the direction of the planar back supporting the back and sliding with respect to the frame, a guideway at the upper end of the back parallel to the elongated structure, a rail on the frame engaged by the guideway, and means for shifting the back to secure lateral movement of the shaft and jaws.

References Cited in the file of this patent

UNITED STATES PATENTS

2,352,632	Heyman	July 4, 1944
2,634,979	Schon	Apr. 14, 1953
2,643,440	Flaws et al.	June 30, 1953
2,721,373	Midgley et al.	Oct. 25, 1955
2,832,478	Malewicz	Apr. 29, 1958

FOREIGN PATENTS

674,494	Great Britain	June 25, 1952