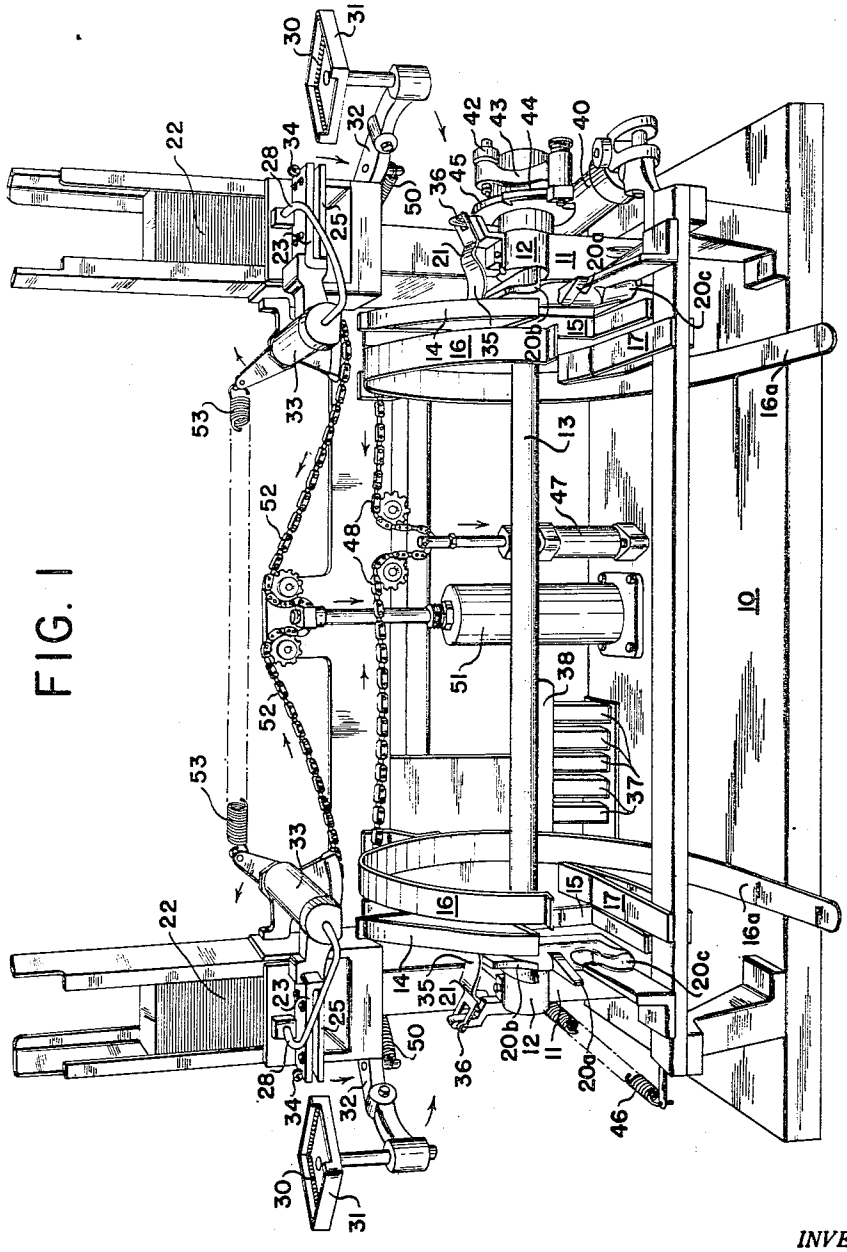
Dec. 18, 1956 P. F. BOWMAN 2,774,204

PATCH END MACHINE

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FIG. 1



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PATCH END MACHINE

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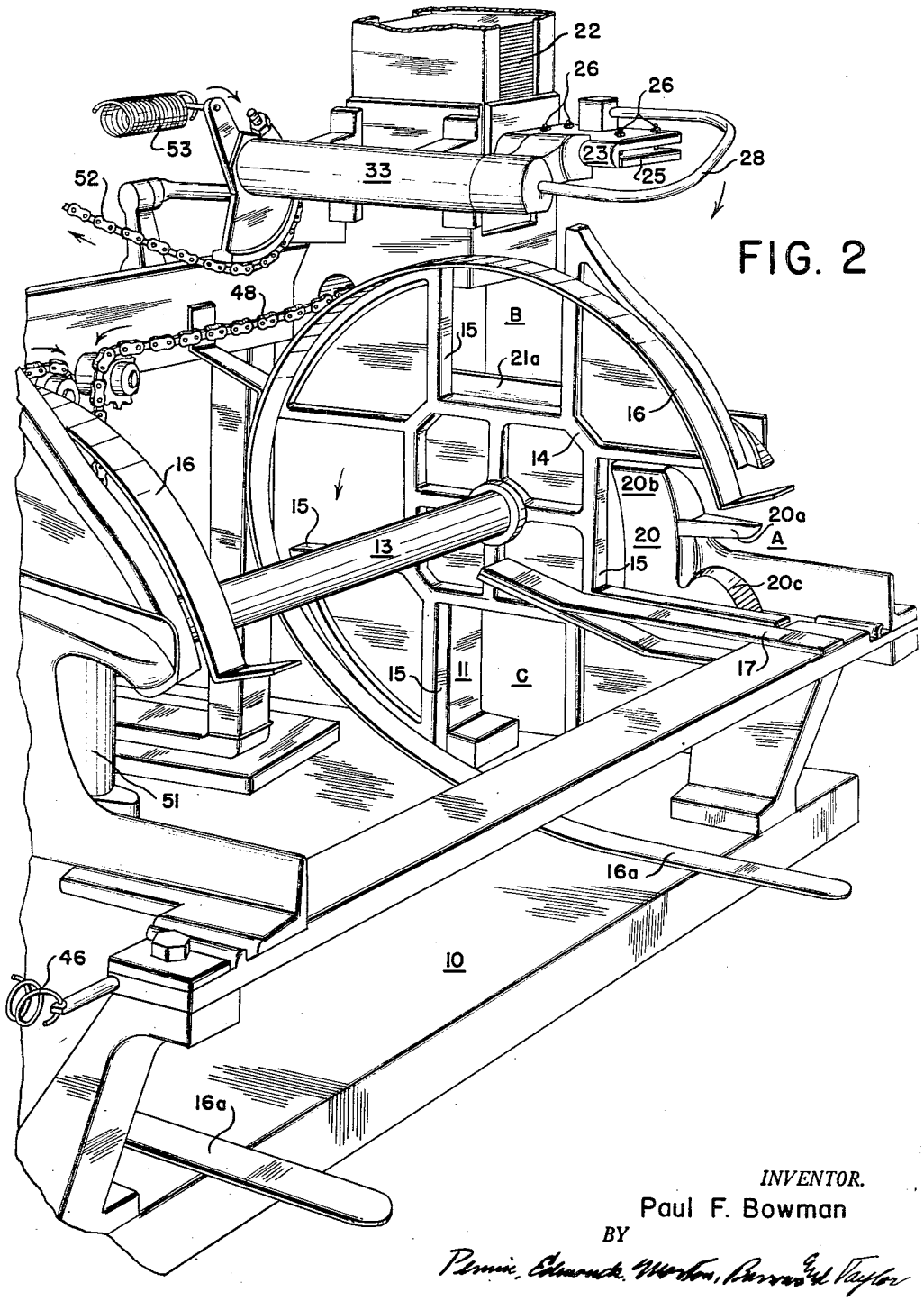


FIG. 2

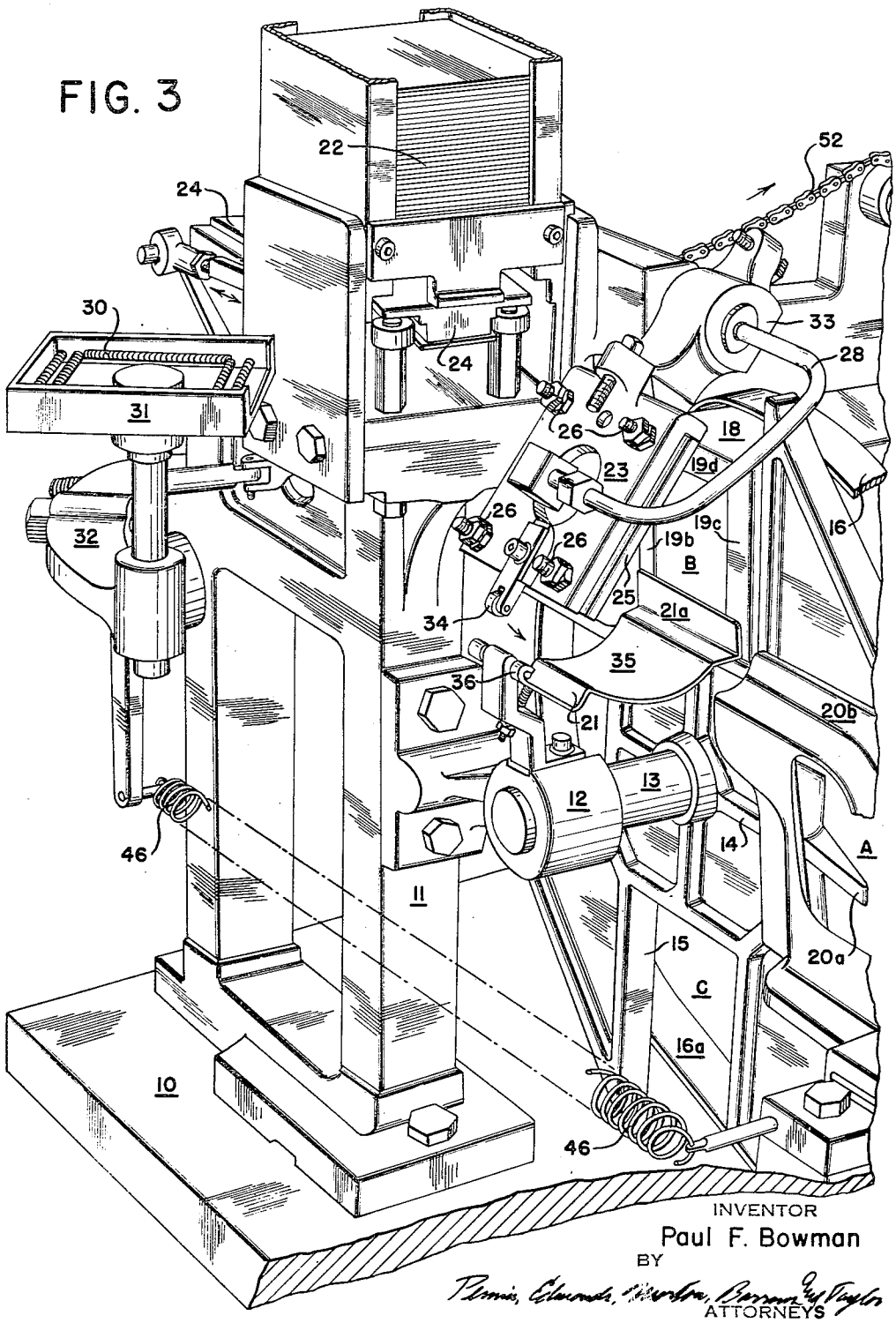
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FIG. 3



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PATCH END MACHINE

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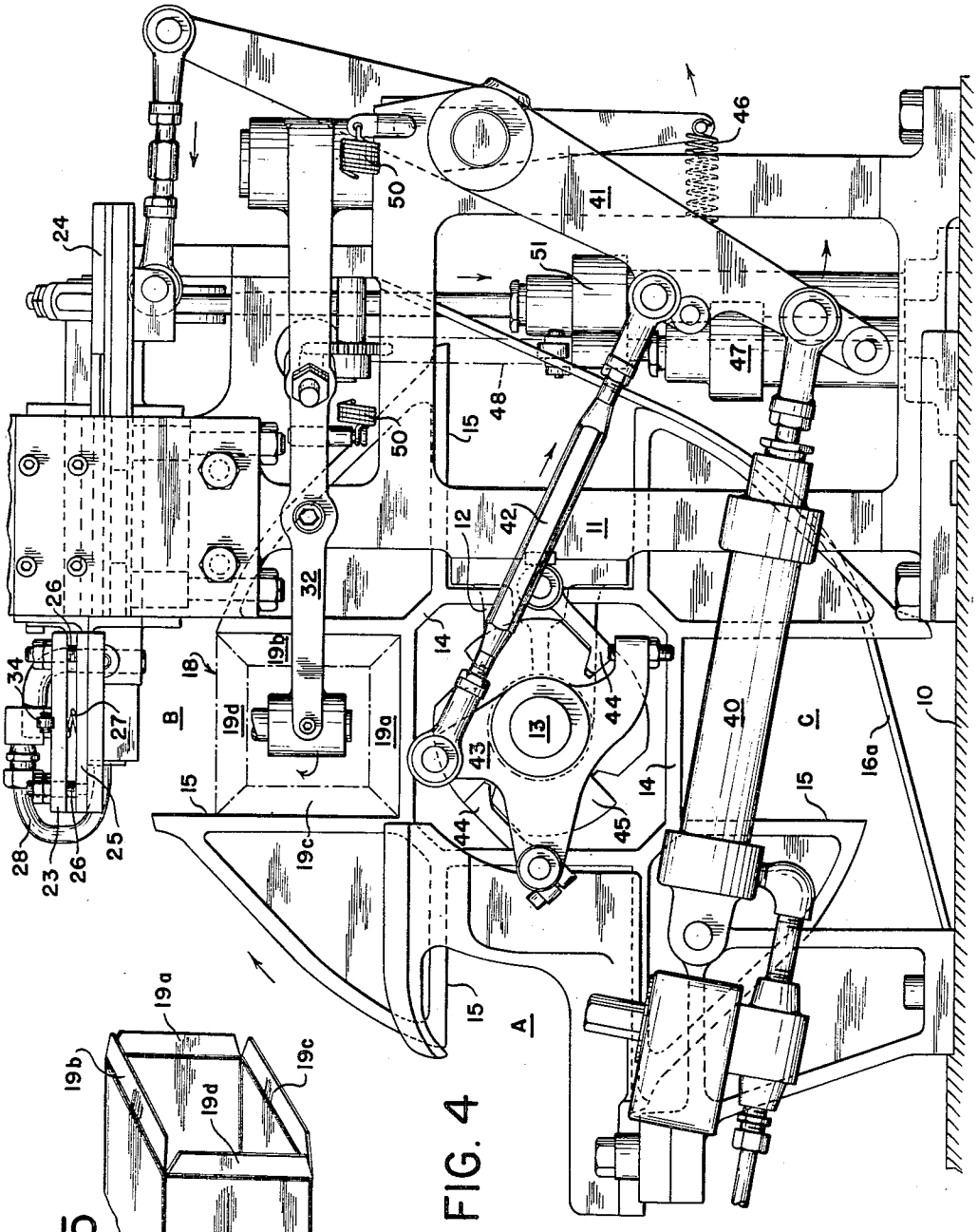


FIG. 4

FIG. 5

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PATCH END MACHINE

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Application January 31, 1955, Serial No. 485,013

5 Claims. (Cl. 53—137)

This invention relates to a patch end machine for applying a sealing patch to the open end of a tubular carton.

In the packaging of articles such as nested paper drinking cups and the like, it is desirable to package the articles under hygienic conditions and to maintain the package in hermetically sealed condition until it is to be opened for use. For this purpose, it is desirable to seal the ends of a tubular paperboard carton containing such articles with a "patch" of paperboard. This patch has the same dimensions as the cross section of the tubular carton and is designed to be adhesively applied to carton end flaps which are folded inwardly normal to the walls of the carton.

I have now devised a machine for applying patch ends to such tubular cartons. The machine of my invention is capable of rapidly applying to the end flaps of the tubular carton a patch provided with a thermoplastic adhesive on the surface of the flap which is brought into contact with the carton end flaps. My machine comprises a rotatable turret adapted to receive and to carry the tubular carton successively from a receiving station through an end-sealing station to a discharge station. The turret is provided with carton-carrying means for holding the carton in axial parallelism with the axis of rotation of the turret. Flap folding guides are so positioned with respect to the turret as to fold the carton end flaps inwardly into patch-receiving position normal to the walls of the tubular carton as the carton is carried from the receiving station to the end-sealing station. A movable patch-holding arm is pivotally mounted for movement in a substantially vertically disposed arc from a horizontal position to a vertical position adjacent the end flap of the carton. The holding arm is provided with suction means adapted to hold a patch to the lower surface of the arm when the arm is held in horizontal position. A patch feeder is provided for feeding a single patch to the lower surface of the patch-holding arm when the arm is in its horizontal position, and a heating element is mounted so as to swing into a patch-heating position directly below a patch held by the holding arm. Holding arm operating means are provided for moving the arm holding a heated patch downwardly into vertical position in contact with the inwardly folded end flaps and thus effecting sealing engagement of the heated adhesive-bearing surface of the patch with the carton end flaps.

These and other novel features of the patch end machine of my invention will be more fully understood by reference to the accompanying drawings in which

Fig. 1 is a perspective front view of the machine, looking slightly downward;

Fig. 2 is a partial perspective view of the inner portion of the right side of the machine taken from the left front of Fig. 1;

Fig. 3 is a similar partial perspective view of the left outer side of the machine shown in Fig. 1;

Fig. 4 is a side elevation of the right outer side of the machine shown in Fig. 1; and

Fig. 5 is a partial perspective view of a tubular carton of the type which is closed and sealed with end patches by the machine shown in Figs. 1 through 4.

As can be seen in Fig. 1, my end patch machine is substantially symmetrical inasmuch as it is designed to simultaneously apply end patches to both open ends of a carton. The machine comprises a base plate **10** provided with upstanding frame members **11** on which there are mounted journals **12** for a rotatable shaft **13**. The journals **12** support the two ends of the shaft **13**, and slightly inboard of each supported end of the shaft there is positioned a quadrant-shaped carton-carrying turret **14**.

Each carton-carrying turret **14**, as can be clearly seen in Fig. 2, comprises a substantially circular frame keyed to the shaft **13** and provided with a plurality of carton receiving openings **15**, four such openings being shown in my presently preferred embodiment. With four carton receiving openings, a quarter revolution of the shaft **13** will move an opening from the receiving position "A" at the front of the machine to the sealing position "B" at the top of the machine. The successive two positions of the turret as it is rotated through successive quarter-turns serve no function except to hold the sealed carton until it leaves the discharge station "C" at the bottom front of the machine. The delivery of an unsealed carton to the turret opening **15** in the receiving position is facilitated by delivery guide strips **17**. During rotation of the turret **14**, the carton is held within its respective turret opening **15** by a substantially circumferential outer guide strip **16**, the lower end of the guide strip being flattened outwardly as at **16***a* in the vicinity of the discharge station "C" so as to provide a discharge ramp.

As a carton **18** (Fig. 5) is manually delivered along the delivery guides **17** to the carton receiving turret opening **15** positioned at the receiving station, the rearward end flap **19***a* of the carton is bent inwardly by the guide fingers **20***a* and the upper and lower end flaps **19***b* and **19***c* are bent downwardly and upwardly, respectively, by the curved upper and lower portions **20***b* and **20***c* of a guide member **20**. As the turret carrying the thus-mounted carton is rotated one-quarter turn, the end flaps **19***a*, **19***b* and **19***c* are maintained in their inwardly folded position as they move into contact with the inner vertical face **21***a* of a spring-loaded flap supporter **21** adjacent the end-sealing station "B," the details of which can be clearly seen in Fig. 3. While the carton is thus being transported from the receiving station "A" to the end-sealing station "B," the front end flap **19***d* is bent inwardly as it passes upwardly past the curved end **20***b* of the guide member **20**. Thus, all four end flaps of the carton will have been folded inwardly as the carton is moved from the receiving station to the end-sealing station. In the latter station, the end flaps **19***a*, **19***b* and **19***c* are maintained in their folded position normal to the carton walls by the vertical end face **21***a* of the end flap supporter **21**, and the end flap **19***d*, which is now in the uppermost position in the end-sealing station, will have been folded downwardly so that it is automatically moved into position normal to the carton walls when the end patch is applied to the end of the carton during the sealing operation.

The sealing of the carton then takes place as the result of a number of preparatory operations which have taken place during and following transportation of the open-ended carton **18** from the receiving station to the sealing station. The first of these preparatory operations comprises the discharge of an end patch **22** from the bottom of a stack of such patches and into position beneath a patch-holding arm **23**. The delivery of a single patch to the patch-holding arm is effected by a conven-

tional coin-feed mechanism 24 mounted on the frame 11 as shown in Figs. 3 and 4. As can be seen in these figures, the bottom patch in the station is moved forward (i. e. to the left in Fig. 4) by the coin-feed mechanism 24 and into position directly below the lower surface of the patch-holding arm 23 pivotally mounted on the frame 11. The lower portion of this holding arm 23 comprises an independent plate member 25 held in adjustable position below the main body of the holding arm 23 by means of spring-loaded bolts 26. The lower surface of the patch-holding plate 25 is provided with surface-engraved channels communicating at the center of the plate with an opening to which there is connected a flexible tube 27 communicating through the upper portion of the holding arm with a vacuum supply line 28. Thus, a patch advanced into position directly below the lower surface of the vacuum plate 25 of the patch-holding arm 23 is held in this position by the vacuum after the coin-feed mechanism 24 has been retracted.

As soon as a patch has been moved into position adjacent the bottom of the patch-holding arm 23, a layer of thermoplastic adhesive with which the lower surface of each end patch has previously been supplied is softened by a heating operation. This heating is supplied by a heating element 30 mounted in a supporting frame 31, and the heating frame 31 is mounted for movement in a horizontal arc on an arm 32 pivotally mounted on the frame 11. By moving the supporting arm 32 in a horizontal arc toward the turret 14, the heating element 30 is moved into heating position directly below the end patch which is vacuum-held to the lower surface of the holding arm 23. After a suitable heating interval, generally one to two seconds, the heating element is swung back to its former position so that the end patch with its heat-softened adhesive can be promptly applied to the inwardly folded end flaps 19 of the carton.

The end patch with its heat-softened adhesive is moved into carton-sealing position by rotating the end patch-holding arm 23 about its pivot bracket 33 mounted on the frame 11. The bracket 33 further includes along its axis a vacuum line connection to the vacuum line 28 so that the vacuum holding the end patch to the arm 23 can be maintained while the arm is swung downwardly into carton-sealing position. As can be more clearly seen by reference to Fig. 3, the outboard end of the patch-holding arm 23 is provided with a projecting fixture provided with a roller 34 at its outer extremity. As the roller 34 engages a curved body portion 35 of the end flap supporter 21, the supporter is deflected downwardly about its spring-loaded hinged end 36 mounted on the frame 11 with the result that the vertical face 21*a* of the supporter is moved out of path of the incoming end patch. The downward swing of the patch-holding arm 23 is continued until the patch is brought into contact with the end flaps 19 of the carton. The heat-softened adhesive on the surface of the end patch which comes into contact with the end flaps 19 promptly secures the patch to the end of the carton so that the carton can be advanced to the next position in its discharge course while the next carton is being advanced from the receiving station to the end-sealing station.

The foregoing sequence of operations is controlled advantageously by a plurality of relays 37 mounted on the base plate 10 and operated by a conventional timing mechanism 38. The timing mechanism is placed in operation by an appropriate actuating switch as soon as the operator of the machine has placed the carton in the carton-receiving station "A" of the turret 14. The timing mechanism then first actuates an air cylinder 40 (Fig. 4) which pushes outwardly on the lower end of a pivoted rocker arm 41 mounted on the frame 11. This movement causes a connecting arm 42 to pull rearwardly on a pawl bracket 43 and thus force a pawl 44 to move a slotted cam wheel 45 mounted on the shaft 13 one-quarter of a revolution so as to advance the carton-holding turrets 14 from the carton-receiving station "A" to the end-sealing station "B." At the same time, the movement of the upper end of the rocker arm 41 actuates the coin-feed mechanism 24 and thus moves an end patch into position directly below the lower surface of the patch-holding arm plate 25. As the coin-feed mechanism 24 is thus operated, the timing mechanism actuates a valve in the suction line so as to apply a suction through the line 28 to the patch-holding arm plate 25. Accordingly, when the coin-feed mechanism 24 is retracted, the end patch will be vacuum-held in position against the lower surface of the patch-holding arm 23. The coin-feed mechanism 24 and the pawl bracket 43 are returned to their starting position by the return of the air cylinder 40 to its starting position as the result of cutting off the air supply to the cylinder 40 and thereby permitting a coil spring 46 to pull the rocker arm 41 back to its starting position.

The continued operation of the machine through the remainder of its operating cycle can be seen more clearly by reference to Fig. 1. At this stage of the operation, each of the patch-holding arms 23 has a single patch held by suction against the lower surface of its holding plate 25. The timing mechanism now actuates an air cylinder 47 which pulls downwardly on chains 48 connected to the two heating element arms 32 and thus swings the arms into heating position directly below the end patches which are held in position by the holding arms 23. As the heating elements 30 are maintained in their heating position for a sufficient period of time, preferably about two seconds, the thermoplastic adhesive on the lower surface of each end patch is softened. The timing mechanism then deactivates the air cylinder 47 so that the heating element arms 32 may be pulled back to their starting positions by tension springs 50. The timing mechanism thereafter activates another air cylinder 51 so as to pull downwardly on chains 52 connected to the patch-holding arms 23 and thus rotate the patch-holding arms about their pivot mountings 33. The end patches with their heat-softened adhesive are thus moved downwardly into position against the inwardly folded end flaps 19 of the carton, and, as previously described, the rollers 34 at the outer extremities of the patch-holding arms 23 move the flap supporters 21 out of the way so that each patch can be applied squarely to the inwardly folded end flaps 19. The timing mechanism then deactivates the air cylinder 51 so that the patch-holding arms can be restored to their starting positions by a tension spring 53. The operating cycle of the machine will thereupon have been completed and is repeated only after another carton has been placed in the now empty receiving portion of the turret in the receiving station "A." As the operation of the machine is successively repeated, the hermetically end-sealed cartons will be discharged along the lower end 16*a* of the carton guide strip whence they are removed by the operator. Thus, except for delivery of a loaded but open carton to the machine, the manual actuation of the timing mechanism and the removal of a sealed carton from the discharge station, the machine automatically carries out all operations required for applying an end patch to either or both ends of the loaded carton.

I claim:

1. A patch end machine for applying a sealing patch to the open end of a tubular carton having end flaps adapted to receive the sealing patch, the patch being provided with a thermoplastic adhesive on the surface thereof which is brought into contact with the carton end flaps, the machine comprising a rotatable turret adapted to receive and carry the tubular carton successively from a receiving station through an end-sealing station to a discharge station, the turret being provided with carton-carrying means for holding the carton in axial parallelism with the axis of rotation of the turret, flap folding guides positioned so as to fold the carton end flaps inwardly into patch-receiving position normal to the walls of the tubular carton as the carton is placed in receiving position in the turret and is carried from the receiving station to the sealing

station, a movable patch-holding arm pivotally mounted for movement in a substantially vertically disposed arc from a horizontal position to a vertical position adjacent the end flaps of the carton, the holding arm being provided with suction means adapted to hold a patch to the lower surface of the arm when the arm is held in horizontal position, a patch feeder for feeding a single patch to the lower surface of the patch-holding arm when the arm is in its horizontal position, a heating element mounted so as to swing into a patch-heating position directly below a patch held by the holding arm, and holding arm operating means for moving the arm holding a heated patch downwardly into vertical position in contact with the inwardly folded end flaps and thus effecting sealing engagement of the heated adhesive-bearing surface of the patch with the carton end flaps.

2. A patch end machine for applying a sealing patch to the open end of a tubular carton having end flaps adapted to receive the sealing patch, the patch being provided with a thermoplastic adhesive on the surface thereof which is brought into contact with the carton end flaps, the machine comprising a rotatable turret adapted to receive and carry the tubular carton successively from a receiving station through an end-sealing station to a discharge station, the turret being provided with four equally spaced peripheral openings constituting carton-carrying means for holding the carton in axial parallelism with the axis of rotation of the turret, flap folding guides positioned outboard of the end of the turret so as to fold the carton end flaps inwardly into patch-receiving position normal to the walls of the tubular carton as the carton is placed in receiving position in the turret and is carried from the receiving station to the sealing station, a movable patch-holding arm pivotally mounted for movement in a substantially vertically disposed arc from a horizontal position to a vertical position adjacent the end flaps of the carton, the holding arm being provided with suction means adapted to hold a patch to the lower surface of the arm when the arm is held in horizontal position, a patch feeder for feeding a single patch to the lower surface of the patch-holding arm when the arm is in its horizontal position, a heating element mounted so as to swing horizontally into and away from a patch-heating position directly below a patch held by the holding arm, and holding arm operating means for moving the arm holding a heated patch downwardly into vertical position in contact with the inwardly folded end flaps and thus effecting sealing engagement of the heated adhesive-bearing surface of the patch with the carton end flaps.

3. A patch end machine for applying a sealing patch to the open end of a tubular carton having end flaps adapted to receive the sealing patch, the patch being provided with a thermoplastic adhesive on the surface thereof which is brought into contact with the carton end flaps, the machine comprising a turret rotatable about a horizontal axis and adapted to receive and carry the tubular carton successively from a receiving station through an end-sealing station to a discharge station, the turret being provided with carton-carrying means for holding the carton in axial parallelism with the axis of rotation of the turret, flap folding guides positioned so as to fold the carton end flaps inwardly into patch-receiving position normal to the walls of the tubular carton as the carton is placed in receiving position in the turret and is carried from the receiving station to the sealing station, an end flap-holding element resiliently held in position adjacent the end of the carton so as to hold the side and lower ends flaps of the carton in a position normal to the carton side walls while the carton remains in the end-sealing station, a movable patch-holding arm pivotally mounted for movement in a substantially vertically disposed arc from a horizontal position to a vertical position adjacent the end flaps of the carton, the holding arm being provided with suction means adapted to hold a patch to the lower surface of the arm when the arm is held in horizontal position and being further provided adjacent its extremity with a bearing element adapted to bear against and move the end flap-holding element out of contact with the end flaps as the holding arm is swung downwardly into its patch-applying vertical position, a patch feeder for feeding a single patch horizontally to the lower surface of the patch-holding arm when the arm is in its horizontal position, a heating element mounted so as to swing horizontally into and away from a patch-heating position directly below a patch held by the holding arm, and holding arm operating means for moving the arm holding a heated patch downwardly into vertical position in contact with the inwardly folded end flaps and thus effecting sealing engagement of the heated adhesive-bearing surface of the patch with the carton end flaps.

4. A patch end machine for applying a sealing patch to the open end of a tubular carton having end flaps adapted to receive the sealing patch, the patch being provided with a thermoplastic adhesive on the surface thereof which is brought into contact with the carton end flaps, the machine comprising a rotatable turret adapted to receive and carry the tubular carton successively from a receiving station through an end-sealing station to a discharge station, the turret being provided with peripherally positioned carton-receiving openings for holding the carton in axial parallelism with the axis of rotation of the turret, a turret guide conforming substantially to the periphery of the turret so as to hold a carton within the turret openings as the turret is rotated, flap folding guides positioned so as to fold the carton end flaps inwardly into patch-receiving position normal to the walls of the tubular carton as the carton is placed in receiving position in the turret and is carried from the receiving station to the sealing station, a movable patch-holding arm pivotally mounted for movement in a substantially vertically disposed arc from a horizontal position to a vertical position adjacent the end flaps of the carton, the holding arm being provided with suction means adapted to hold a patch to the lower surface of the arm when the arm is held in horizontal position, a patch feeder for feeding a single patch to the lower surface of the patch-holding arm when the arm is in its horizontal position, a heating element mounted so as to swing horizontally into and away from a patch-heating position directly below a patch held by the holding arm, and holding arm operating means for moving the arm holding a heated patch downwardly into vertical position in contact with the inwardly folded end flaps and thus effecting sealing engagement of the heated adhesive-bearing surface of the patch with the carton end flaps.

5. A patch end machine for applying a sealing patch to the open end of a tubular carton having end flaps adapted to receive the sealing patch, the patch being provided with a thermoplastic adhesive on the surface thereof which is brought into contact with the carton end flaps, the machine comprising a rotatable turret adapted to receive and carry the tubular carton successively from a receiving station through an end-sealing station to a discharge station, the turret being provided with carton-carrying means for holding the carton in axial parallelism with the axis of rotation of the turret, flap folding guides positioned so as to fold the carton end flaps inwardly into patch-receiving position normal to the walls of the tubular carton as the carton is placed in receiving position in the turret and is carried from the receiving station to the sealing station, a movable patch-holding arm pivotally mounted for movement in a substantially vertically disposed arc from a horizontal position to a vertical position adjacent the end flaps of the carton, the holding arm being provided with suction means adapted to hold a patch to the lower surface of the arm when the arm is held in horizontal position, a patch feeder for feeding a single patch to the lower surface of the patch-holding arm when the arm is in its hori-

zontal position, a heating element mounted so as to swing horizontally into and away from a patch-heating position directly below a patch held by the holding arm, holding arm operating means for moving the arm holding a heated patch downwardly into vertical position in contact with the inwardly folded end flaps and thus effecting sealing engagement of the heated adhesive-bearing surface of the patch with the carton end flaps, and a timing element a complete cycle of which rotates the turret so as to carry a carton from the receiving station to the end sealing station, feeds a single patch to a position adjacent the lower surface of the patch-holding arm, applies suction to the lower surface of the patch-holding arm so as to hold the patch in contact therewith, swings the heating element into heating position directly below the patch held by the patch-holding arm, swings the heating element away from its heating position after the patch has been heated sufficiently to render tacky the thermoplastic adhesive on the lower surface of the patch, and finally moves the patch-holding arm downwardly so as to bring the tacky adhesive-bearing surface of the patch into sealing engagement with the carton end flaps.

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