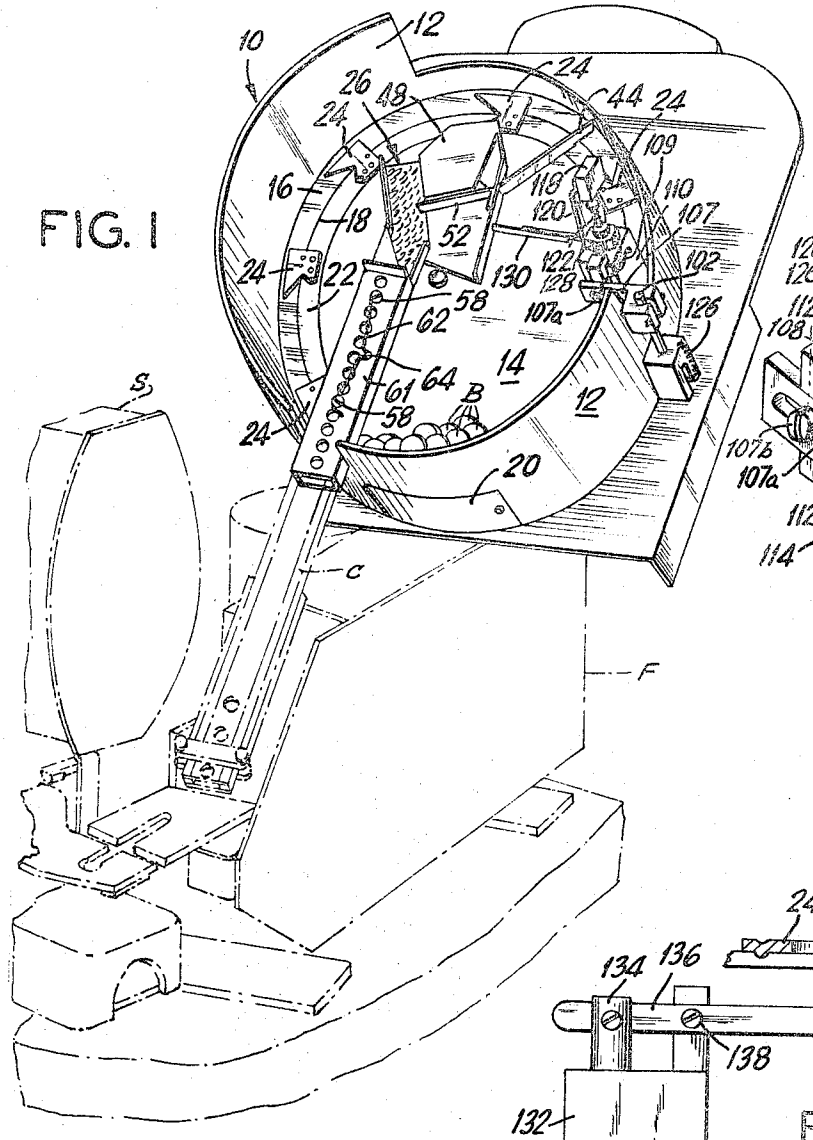
Aug. 22, 1967 B. BRONFMAN 3,337,089

ORIENTING HOPPER FOR BUTTON FEEDING MECHANISM

Filed July 6, 1965 3 Sheets-Sheet 1

FIG. 1



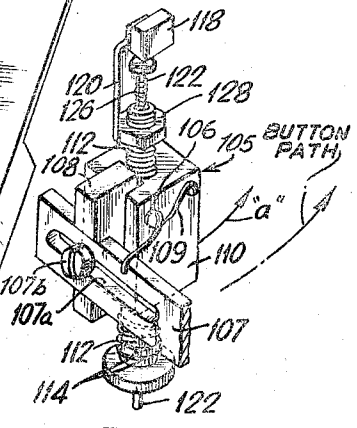


FIG. 7

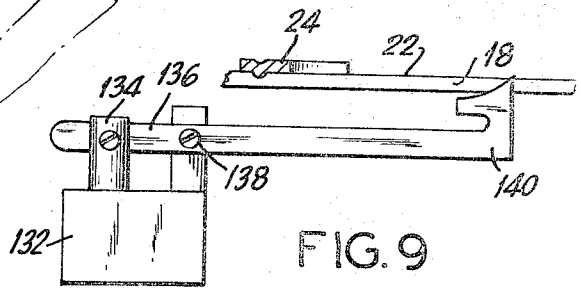


FIG. 9

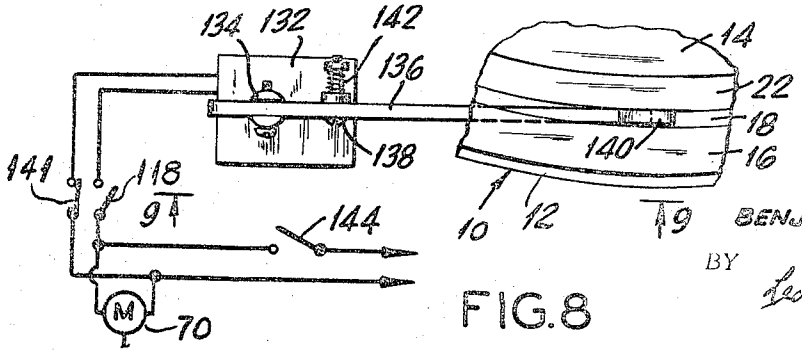


FIG. 8

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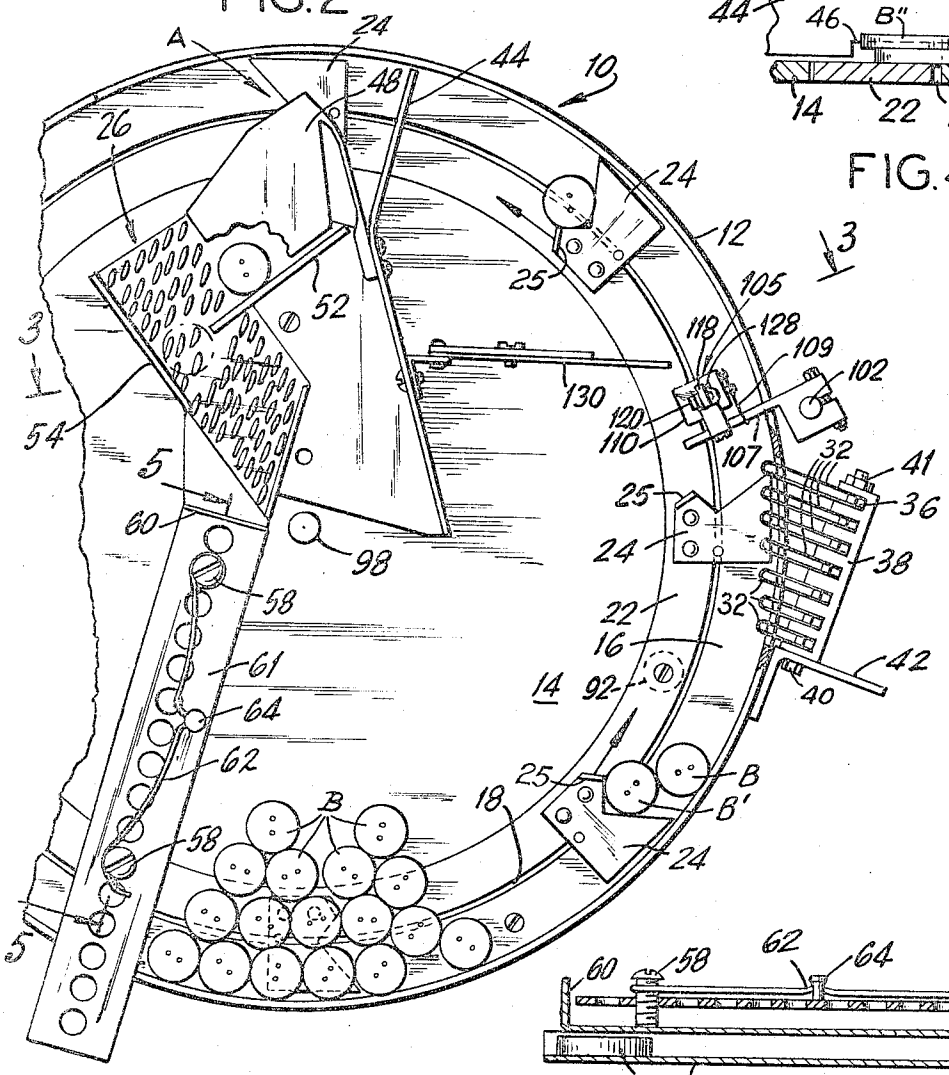
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Aug. 22, 1967 B. BRONFMAN 3,337,089

ORIENTING HOPPER FOR BUTTON FEEDING MECHANISM

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FIG. 2



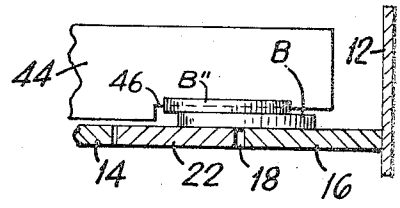


FIG. 4

FIG. 5

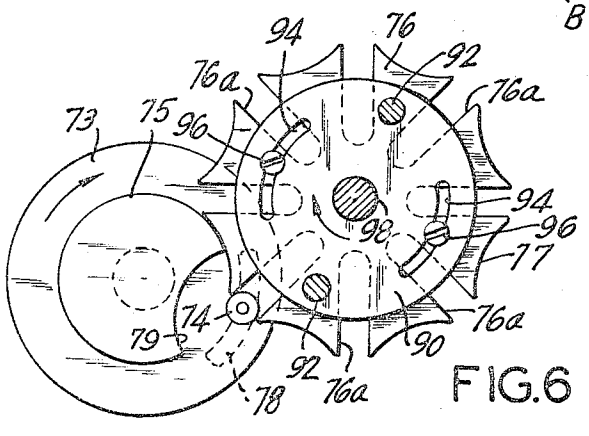


FIG. 6

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ORIENTING HOPPER FOR BUTTON FEEDING MECHANISM

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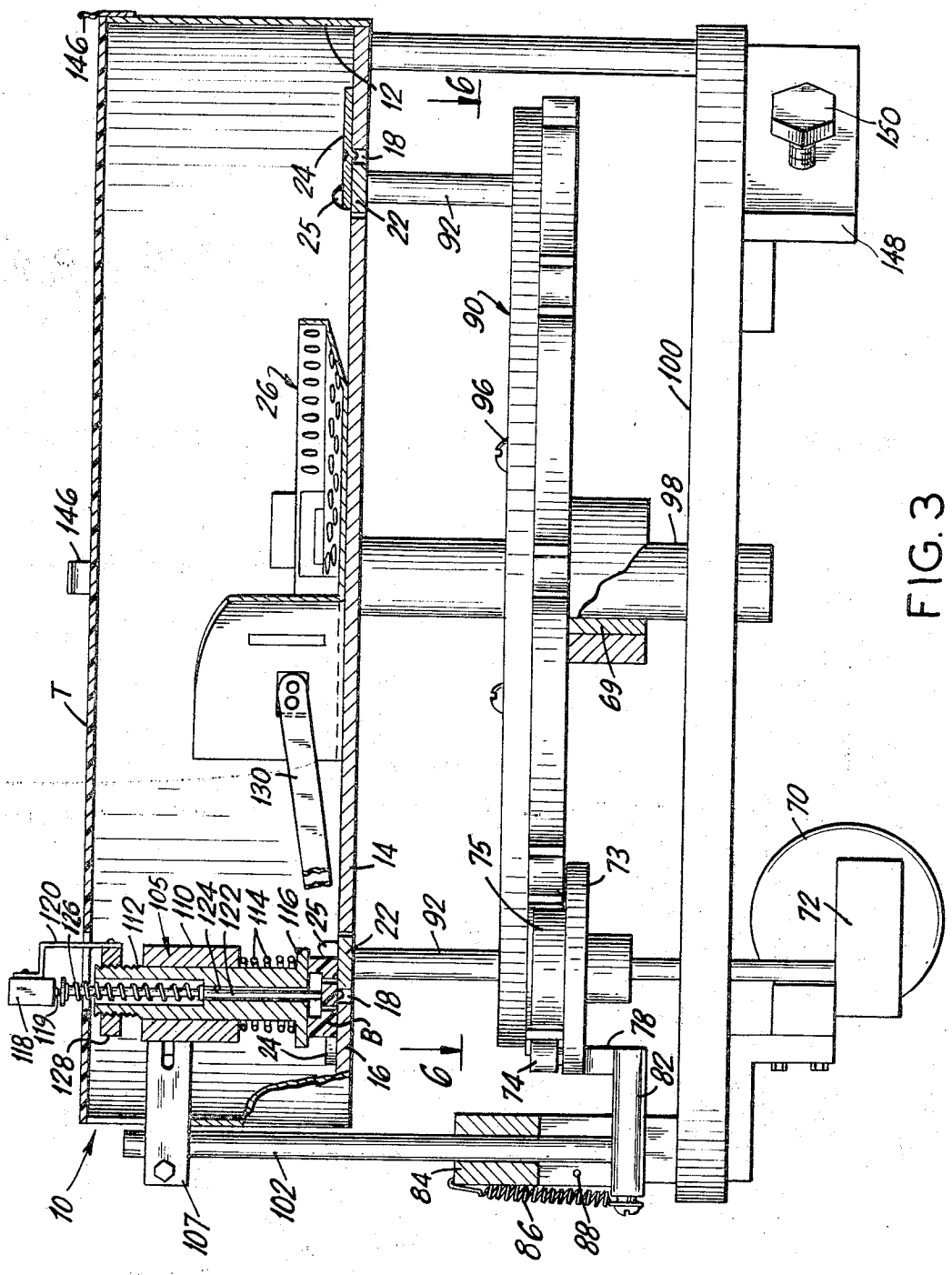


FIG. 3

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United States Patent Office 3,337,089 Patented Aug. 22, 1967

3,337,089 ORIENTING HOPPER FOR BUTTON FEEDING MECHANISM

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Filed July 6, 1965, Ser. No. 469,523
23 Claims. (Cl. 221—160)

This invention relates generally to feed hoppers and is especially directed to improved apparatus adapted for automatically delivering properly faced buttons to a button feeder such as used with a sewing machine.

There are many devices employed for feeding buttons from a hopper to the automatic button feed device used with a sewing machine. Ordinarily, means are not provided for turning over the button. Accordingly, these devices require that the button, as fed from the hopper, be correctly positioned with the proper side up so that the feeder will supply the button to the sewing machine in the proper position for being sewn to a garment.

The present invention may be used with buttons having either two flat faces or one flat face and a depression in the opposite face.

The hopper must deliver buttons consistently and positively sense and reject improperly faced buttons. Because tolerances are so broad in the manufacturing of buttons, the sensing means must be independent of the thickness of the button and responsive only to the face of the botton that is flat and does not have a depression. Where the button is flat on both sides the sensing means is not required.

It is also essential that the hopper mechanism be capable of accommodating different size buttons with but simple adjustment. The hopper action must be positive, reliable and most important, the hopper must have a long and useful life with a minimum of maintenance requirements.

A high performance level must be maintained even under adverse operating conditions. For example, the normal operating condition includes the presence of lint and fibers of cotton and other material which can interfere with the operation of such a hopper.

Accordingly, it is an object of the present invention to provide an improved hopper for button feeding apparatus employed with a sewing machine which avoids the above mentioned difficulties and which permits of simple adjustment for the accommodation of buttons of a great variety of sizes and shapes.

It is a particular object of the present invention to provide a hopper for a button feeding apparatus which senses the facing of the button at a time in the cycle when the button is stationary.

An additional object is to provide sensing means that is not effected by differences in the overall thickness of the button.

A feature of the present invention is that for buttons having one flat face and a depression in the opposite face, the sensing means of the present invention is responsive only to the face that is flat.

Still another object of this invention is to provide a hopper of such construction as to be durable and reliable throughout its normal service.

A different object of this invention is to provide a hopper arrangement which is not subject to jamming of the button supply.

Another object of this invention is to provide a hopper in which the supply of buttons will not jam buttons in a sewing machine button feeder attachment.

A further object is to provide improved means for rejecting and displacing improperly faced buttons.

An additional object is to provide means for assuring

that only one button is at a sensing station at a particular time.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in, part, become obvious from the following more detailed description of the invention taken in conjunction with the accompanying drawing which forms an integral part thereof.

In the various figures of the drawing like reference characters designate like parts.

In the drawing:

FIG. 1 is a pictorial view illustrating the physical relationship of a sewing machine and an automatic button feeder with respect to the hopper of the present invention;

FIG. 2 is a partial plan view of the present invention;

FIG. 3 is a side elevation view partially broken away and taken along line **3—3** of FIG. 2;

FIG. 4 is an elevational detail view of one component of the improved hopper assembly;

FIG. 5 is a longitudinal sectional elevation view of the delivery chute taken along line **5—5** of FIG. 2;

FIG. 6 is a fragmentary plan view taken along line **6—6** of FIG. 3;

FIG. 7 is a fragmentary elevation view of a portion of the button sensing means;

FIG. 8 is a fragmentary plan detail of the means provided for ejecting an improperly faced button; and

FIG. 9 is a fragmentary elevational view taken along line **9—9** of FIG. 8 plus a schematic diagram of the circuitry used with the present invention.

Referring now to the drawing and specifically to FIG. 1, there is shown a sewing machine S which is supplied with buttons from a button feeder F, and a hopper **10** which supplies buttons B to the inclined chute C of feeder F. The buttons are randomly poured into a pile at the bottom of hopper **10** and are carried to a funnel member in the hopper. It will be noted that the hopper is positioned at an angle with reference to the horizontal.

Referring now to FIG. 2 and FIG. 3, the hopper is provided with a cylindrical side wall **12** which extends over approximately 270 degrees of the hopper circumference at one height, the remaining 90 degrees of the wall being somewhat lower. The hopper is also provided with concentric bottom wall portions **14** and **16** defining an annular space **18** therebetween. Since the hopper is inclined, the buttons randomly accumulate in the bottom half of the hopper. Door **20** in wall **12** provides means to empty the hopper when, for example, the buttons are to be changed.

Ring **22**, rotatingly positioned in annular space **18** has eight uniformly spaced V-shaped claws **24**. Preferably, one ear **25** of each claw is bent up to provide mixing action to reorient the buttons. As the ring is driven, by means to be described more fully hereinafter, the claws each pick up at least one button B and carry it around to the apex A of the hopper. At this point gravitational force pulls the button off the lower edge of the V-shaped claw and drops it down into a chute member **26**. The button hits a wall and rolls down into a guide track **30** which connects with the feeder-chute C.

Since the hopper is intended to accommodate a range of button sizes, claw **24** may at times pick up several small buttons, as shown in FIG. 2. In that event, as the ring rotates, button B will intersect and deflect one or more of the spring fingers **32** made of resin-impregnated glass fiber cloth. The resilience of the fingers will push button B into the crotch of the claw to displace and eject button B'.

Spring fingers **32** may be made from a flexible strip approximately ¼" high by 0.010" thick which is folded into irregular loops approximately ½" long. The folds of the spring are positioned in slots **36** formed in bar **38** and

secured thereto by screw **40** and nut **41**. The entire assembly is supported by angle bracket **42** which is provided with a slot to permit angular adjustment of the sweeper assembly with respect to the circumferential path of the claw. In the event that the extra button is on the left, in the position occupied by button B', then sweeper **44** (FIG. 4) will intercept and deflect it. It will be noted that sweeper **44** is provided with a notch **46** so that a single button B'' will pass underneath but a second button resting on top of a properly positioned button B will be deflected should a rejected button fall back upon an accepted button beyond the sensor.

As button B reaches the apex and slides down into chute member **26** having an embossed surface, a cover plate **48** prevents it from falling off. Cover member **48** may be adjusted vertically with respect to the lower surface of the chute member by means of screw and slot arrangement. The button then strikes adjustably positioned wall **52**, slides through the space defined by the end of wall **52** and wall **54**, passes under cover **56** and then down guide track **30**. Inner cover **56** may be raised and lowered by means of adjusting screws **58** secured to the cover to assure that there is room for single button only, thereby avoiding a later pile-up of two buttons (FIG. 5). Inner cover **56** is formed of a single metal strip which is preferably bent up at its upper end to provide an upstanding wall **60**. This construction prevents buttons from falling in between the outer cover **61** and inner cover **56**. Spring **62** acts against post **64** and screws **58** to prevent them from rotating.

In the event that the guide track **30** is filled, excess buttons will fall off the upper end of the chute and back into the button pile for repickup. Since the buttons are fed into the track by gravity there is no pressure on them, other than their own weight, to cause a jam-up.

Thus there has been described above the cycle for a button which is properly faced and which would be suitable for a button which is identical on both surfaces. However, buttons are generally nonsymmetrical with respect to their top and bottom surfaces. That is, one button surface is flat and the opposite surface has a depression. These buttons must be delivered to the sewing station with the depression facing upwards. Means are provided in the present apparatus for detecting and rejecting inverted nonsymmetrical buttons. If a button with a flat upper surface and recessed lower surface is used, a delivery chute with a 180° twist is used to invert the button.

As the buttons are moved circumferentially by the ring **22**, they reach a test position at which time a feeler gage determines whether or not the button is inverted. A feature of this invention is that this test is made at a time when the button is at rest.

In order to achieve the necessary intermittent motion, a Geneva drive is employed. Motor **70** is coupled through a right angle drive **72** to a Geneva driver **73** (FIG. 6). The driver carries roller **74** which is arranged to engage driven wheel **76**. The driven wheel shown has, for example, eight radial slots **76***a* located 45 degrees apart so that roller **74** engages one of these slots each time the driver makes a revolution. Thus the driven wheel turns ⅛ revolution. The concentric surface **75** engages the concave surface **77** between each pair of slots before the roller is disengaged from the slot in the driven wheel. This prevents the driven wheel **76** from rotating while the roller **74** is moving around to engage the next successive slot. The circular boss on the driver **73** is cut away at **79** to provide clearance for the projecting slotted arms of the driven wheel.

The underside of driver **73** carries a cam member **78**, the high point of which is angularly coincidental with roller **74**. Therefore, cam **78** engages cam follower **82** at a time when the driven wheel is stationary. Cam follower **82** rides in slotted block **84** and is driven downwardly by the cam against the biasing force of spring **86**. Screw **88** limits the upward travel of the follower.

Driven wheel **76** has adjustably affixed thereto a phasing plate **90** upon which are mounted upright spacer posts **92** (FIG. 6). Annular ring **22** is in turn affixed to the posts so that it may be intermittently rotated by wheel **76**. Slots **94** in plate **90** permit angular phasing orientation of the plate **90** with respect to wheel **76**. Screws **96** are used to clamp together plate **90** and driven wheel **76** when they are properly phased. Driven wheel **76** journaled in suitable bearings **69** rotates about a fixed shaft **98** which is supported by base plate **100**. The inner, bottom wall **14** of hopper **10** is fixed to the end of shaft **98**.

As cam **78** engages cam follower **82**, moving it downwardly, vertical shaft **102**, slidably disposed in block **84** and attached to cam follower **82**, moves downwardly together with a sensing assembly shown generally by numerals **105**. It will be noted that sensing assembly **105** may be vertically adjusted by loosening clamp means **107** and horizontally adjusted by means of a conventional screw and slot arrangement **107***a*. Sensing assembly **105** is also pivotally mounted with respect to clamp means **107** by a torsion spring **109** extending therebetween. Sensor assembly **105** is pivotal about pin **106** in the direction shown by arrow "*a*" in FIG. 7. The pin **106** extends through a block **108** that is secured to clamp means **107** by means of screw **107***b*. Block **108** fits loosely in a groove in the sensing assembly. As shown in FIG. 7 torsion spring **109** is wrapped about pin **106** and extends between block **105** and clamp means **107**.

The sensing device (FIG. 3) must be able to differentiate between an inverted button and a face-up button. Pivoted block **110** carries a hollow, sliding shaft **112**. Spring **114** extends between flange **116** of shaft **112** and the underside of block **110**, to thrust the lower face of the flange against the upper face of the button B under test. Shaft **102** continues downward travel so that buttons of various thicknesses will be sensed. Shaft **112** has a switch **118** secured to the upper end thereof by means of a bracket **120**. Shaft **122** is slidably supported in central bore **124** of shaft **112** and extends below flange **116**. The lower end of shaft **122** falls into a prepositioned depression on the top surface of button B to sense that the button is properly faced.

As shown in FIG. 3, the action of cam **78** has lowered shaft **102** and the bottom end of sensing shaft **122** is seated in the depression of a correctly facing button. The upper end of shaft **122** while against the switch actuator pin **119** will not move it sufficiently to actuate the internally spring loaded switch contacts. Since the button is correctly faced, it will continue moving intermittently along a circumferential path for delivery to the chute as hereinbefore described. However, if the button is incorrectly faced with its flat surface directed upward, then shaft **122** is also directed upwardly against the switch pin **119** sufficiently to actuate the switch contact to complete an electrical solenoid circuit.

Spring **126** resiliently supports shaft **122** so that the dimensional relationship between the button surface of flange **116** and the lower end of sensing shaft **122** is always maintained. Thus the sensing means is independent of the thickness of the button which may vary greatly due to the wide range of manufacturing tolerances. Accordingly, the sensing switch will be activated only when the button depression faces downwardly. Cooperating with the shaft and flange arrangement is a nut threadably secured to the upper end of shaft **112**. The nut serves as a mounting means for switch bracket **120** so that the spacing between the upper end of shaft **122** and the contact of switch **118** may be accurately set and easily maintained.

To prevent the annular ring from coasting after it has been indexed by the Geneva motion, a brake **130** is provided (FIG. 2). This brake consists of an arm formed of a spring material such as the impregnated fabric which brushes against the edge of the button so as to stop rotation. When the annular ring is being driven, then there is sufficient force exerted to push the button past the slight restraining action of the brake arm.

In the event that the button is inverted and the microswitch is closed, then solenoid **132** is energized pulling down armature **134** and lever **136** mounted thereon (FIGS. 8 and 9). The lever is pivoted on pin **138** whereby lever end **140** enters the slot **18** adjacent to the annular member **22** so as to throw out the button just sensed. Compression spring **142** disposed about pin **138** provides a frictional pivot point. The lever member is located directly ahead of the sensing position and accordingly throws out the button immediately after it has been sensed.

At this time is should be pointed out that claw **24** is provided with a downwardly extending dimple **24***a* which rides in the annular slot **18** adjacent ring **22**. The circumferential movement of the claw causes dimple **24***a* to push down lever **136** thereby restoring the armature to its unenergized position. The pivoting motion of lever arm **136** is controlled by spring **142** so that it will remain fixed subject to actuation either by armature **134** or dimple **24***a*.

As is shown in FIG. 8, the electrical circuit for the apparatus is quite simple. The apparatus is connected to a conventional electrical line through a main switch **144**, the closing of which will actuate the drive motor **70** and energize the circuit to the solenoid **132** through the microswitch **118** whereby closing of the microswitch will actuate the solenoid. Switch **141** permits disabling of the solenoid circuit for convenience of the user in adjusting the apparatus for different size buttons.

Spring clips **146** serve to retain top cover T which may be of a transparent plastic so as to enable the operator to readily determine whether or not an additional supply of buttons is required. The unit may be provided with an angle member **148** and screws **150** to permit attaching the feeder to utilization means such as a button feeder.

It will be appreciated that the device described above is assembled from simple, reliable, actuating elements which are sturdy and are not dependent on fine adjustments or close tolerances and nowhere rely on delicate members for operation.

The present invention is particularly useful in feeding properly faced, nonsymmetrical buttons to a utilization device without resorting to the conventional twisted or helical track which is costly and troublesome in high speed construction. Means are provided to intermittently move a button carrier and, in combination therewith, still other means assure that one and only one button is carried to the sensing station by each movement of the carrier. If the button is properly faced for sewing, it continues its intermittent motion and is carried in this position to a delivery chute for transport to the utilization device. If the button is improperly faced, ejector means associated with the sensing station automatically removes the button from the carrier.

The sensing station, in addition to being adjustable in two mutually perpendicular planes, is also pivotally mounted thus precluding the possibility of damage should several buttons accumulate therebelow. In addition, the construction of the sensing means makes it independent of the button thickness which can vary greatly due to manufacturing tolerances. Instead, the sensing means detects only the difference in height between the top button surface and the base of a depression in the top surface. This is a properly faced button and accordingly the switch associated with the sensor is not actuated. However, if the button is inverted and improperly positioned for sewing, then the sensing means only touches the top button surface. The microswitch is actuated by the elevated position of the microswitch and in turn closes the circuit to a solenoid which controls the ejection means. The two aforementioned sensing conditions occur only when the button is stationary in between its intermittent circumferential motions.

There has been disclosed heretofore the best embodiments of the invention presently contemplated and it is to be understood that various changes and modifications may

be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. An improved hopper for holding a reserve supply of randomly faced buttons and for automatically delivering correctly faced buttons to a sewing machine button feeding attachment, said hopper comprising:

(a) a button chamber adapted to hold the supply of randomly faced buttons said chamber including;

(1) an upstanding circumferential wall devoid of any openings at the base thereof through which the buttons may pass;

(2) a fixed base member having an annular space therein, said base member being rigidly secured at its periphery to said wall; and

(3) a ring rotatably disposed within the annular space in said base member;

(b) a plurality of angularly displaceable claw members secured to the upper surface of said ring for rotation therewith, each of said claw members being adapted to carry a button along a circumferential path;

(c) means to intermittently move said claws along the circumferential path;

(d) means to sense the facing direction of the button carried by one of said claws when said claw is stationary between intermittent movements;

(e) means to eject an improperly faced button after it has been sensed; and

(f) means to deliver a properly sensed button to the button feeding attachment.

2. The apparatus in accordance with claim **1** including mixing means integral with and extending upwardly from said claw members whereby rotation of said ring member causes mixing of the randomly faced buttons in said chamber.

3. The apparatus in accordance with claim **1** wherein said claw member is comprised of a substantially flat plate having a wedge-shaped end facing in the direction of its travel, said wedge-shaped end being defined by a pair of legs forming an angle therebetween.

4. The apparatus in accordance with claim **1** including paddle means carried by said ring member for mixing the buttons in said hopper.

5. The apparatus in accordance with claim **1** wherein said means to intermittently move said claw members comprises:

(a) a motor having a drive shaft;

(b) a Geneva mechanism having a driving plate coupled to the drive shaft of said motor for continuous movement therewith and a driven plate coupled to the driving plate for intermittent angular movement with respect thereto, said angular movement of the driven plate being a fraction of the movement of the driver plate and

(c) means mechanically linking said claw members to the driven plate whereby said claw members are actuated by the driven plate of said Geneva mechanism.

6. The apparatus in accordance with claim **5** including phasing means adapted to vary the angular relationship between said Geneva mechanism driver plate and said claws.

7. The apparatus in accordance with claim **1** wherein said sensing means is pivotally mounted and there is also included a biasing member acting on said sensing means.

8. In a hopper including a button chamber adapted to hold a supply of randomly faced buttons, a plurality of claws and means arranged to intermittently move the claws whereby a button is carried by a claw along a circumferential path, improved means to sense the facing direction of the button, said improvement comprising;

(a) a block member mounted on the button chamber;

(b) a first plunger slidably positioned in said block member, said first plunger having a transverse lower

face adapted to seat on the rim of the button, said lower face being normally positioned in spaced relation above the plane of the upper button surface;

(c) means to seat said lower plunger face on the upper button surface in timed relationship to the intermittent movement of the claw, said plunger being seated when the claw is stationary;

(d) first biasing means normally urging said plunger face away from said block and onto the button rim;

(e) a second plunger slidably disposed within said first plunger and arranged to extend below said transverse face thereof, said second plunger being adapted to drop into the depression of a correctly faced button, said second plunger being urged upwardly by the flat surface of an incorrectly faced button;

(f) switch means responsive to the upward movement of said second plunger; and

(g) button ejection means responsive to the actuation of said switch means whereby an improperly faced button is ejected.

9. The apparatus in accordance with claim 8 including second biasing means normally urging said second plunger in a direction away from the transverse face to said first plunger.

10. The apparatus in accordance with claim 8 including means to set a spaced relation between the upper end of said second plunger and said switch means.

11. The apparatus in accordance with claim 8 wherein said ejection means comprises:

(a) a solenoid having an armature responsive to the actuation of said switch means;

(b) a lever pivotally mounted on said solenoid, said lever having a first end secured to and movable with the armature of said solenoid from a first starting position to a final position and a second end adapted to be positioned in the circumferential path of an improperly faced button after the button is sensed whereby the second end of said arm ejects the button from the claw.

12. The apparatus of claim 11 including means for depressing said lever after passage of a claw to return said armature to the starting position.

13. The apparatus in accordance with claim 8 wherein said means to seat the lower face of said first plunger comprises:

(a) a rod secured at one end to said block;

(b) a cam follower secured to the opposite end of said rod;

(c) cam means carried by the means to impart intermittent motion to the claws, said cam means being arranged to engage said cam follower when the said claw members are stationary in between intermittent movements whereby the lower face of said first plunger is urged into seating position on the upper button surface.

14. The apparatus in accordance with claim 1 wherein said chamber is fixed at an angle to the horizontal plane and wherein said means to deliver a properly faced button comprises a hollow inclined chute having its upper end in communication with the highest point on the circumferential path and its lower end in communication with the button feeding attachment whereby a properly faced button falls off the carrying claw and into said chute and is gravity-fed to the button feeding attachment.

15. The apparatus in accordance with claim 14 wherein the interior height dimension of said chute is variable, said dimension being maintained only slightly greater than the thickness dimension of the button.

16. The apparatus in accordance with claim 1 including sweeper fingers positioned in the circumferential path of the buttons at a point prior to the sensing thereof, said fingers being arranged to displace all but one button from each of said claws when said buttons are all disposed in a common plane.

17. The apparatus in accordance with claim 16 wherein said fingers are resilient.

18. The apparatus in accordance with claim 1 including brake means positioned to engage a button carried by one of said claws at the sensing position whereby the button is prevented from coasting past said sensing means.

19. The apparatus in accordance with claim 1 including a sweeper finger positioned in the circumferential path of the buttons at a point subsequent to the sensing thereof, said finger being arranged to displace a button superimposed on top of the button carried by said claw.

20. The apparatus in accordance with claim 19 wherein said finger is rigid and is provided with a notch, the notch being of sufficient depth to permit only a single thickness of button to pass therethrough.

21. The apparatus in accordance with claim 8 wherein said block is pivotally mounted and resiliently biased with respect to the chamber.

22. In a hopper including a button chamber adapted to hold a supply of randomly faced buttons, a plurality of claws and means arranged to intermittently move the claws whereby a button is carried by a claw along a circumferential path, improved brake means to prevent a button from coasting past means to sense the facing direction of the button, said brake means comprising a resilient finger positioned to engage the button at the sensing position, the movement of the button carried by the claw after the button is sensed being sufficient to deflect the finger.

23. In a hopper including a button chamber adapted to hold a supply of randomly faced buttons, the chamber being defined by an upstanding circumferential wall, a fixed base wall and a ring member rotatable within an annular space in the base wall, a plurality of claw means secured to the ring member and arranged to be intermittently moved along a circumferential path while carrying a button and means to sense and eject an improperly faced button, the improvement comprising a downwardly extending member positioned within the annular space in the base wall of the chamber, said member being positioned to engage the ejection means after the button is sensed whereby the ejection means is returned to its original position if the button sensed was improperly faced and ejected.

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