Aug. 26, 1941. S. M. GLICKSTON 2,253,852

SWAB MAKING MACHINE

Filed Dec. 31, 1938 6 Sheets-Sheet 1

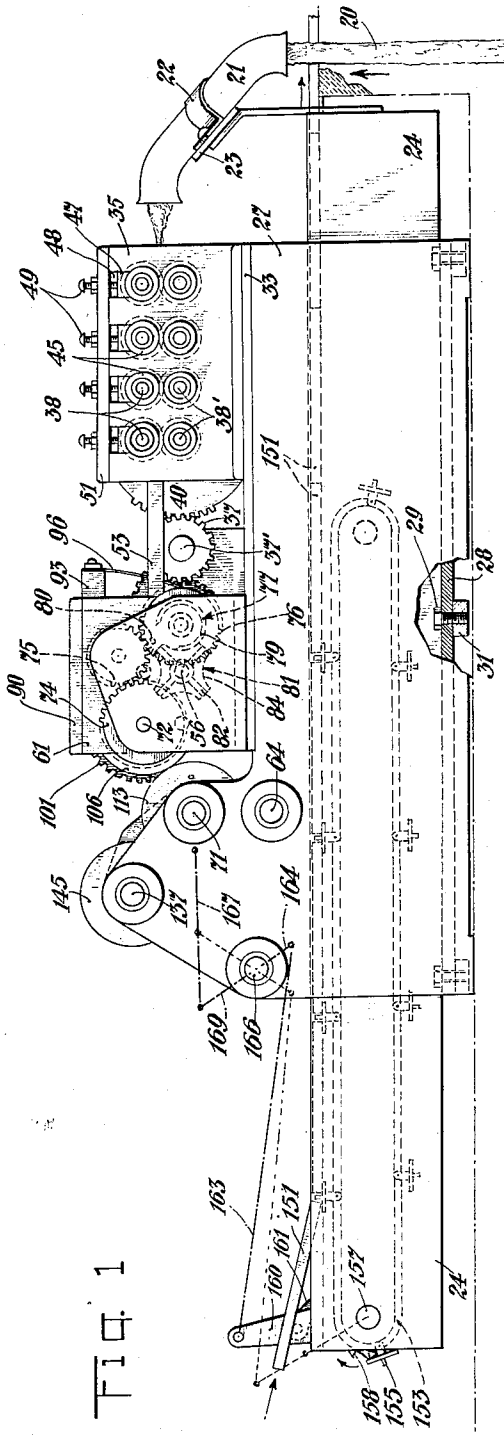


FIG. 1

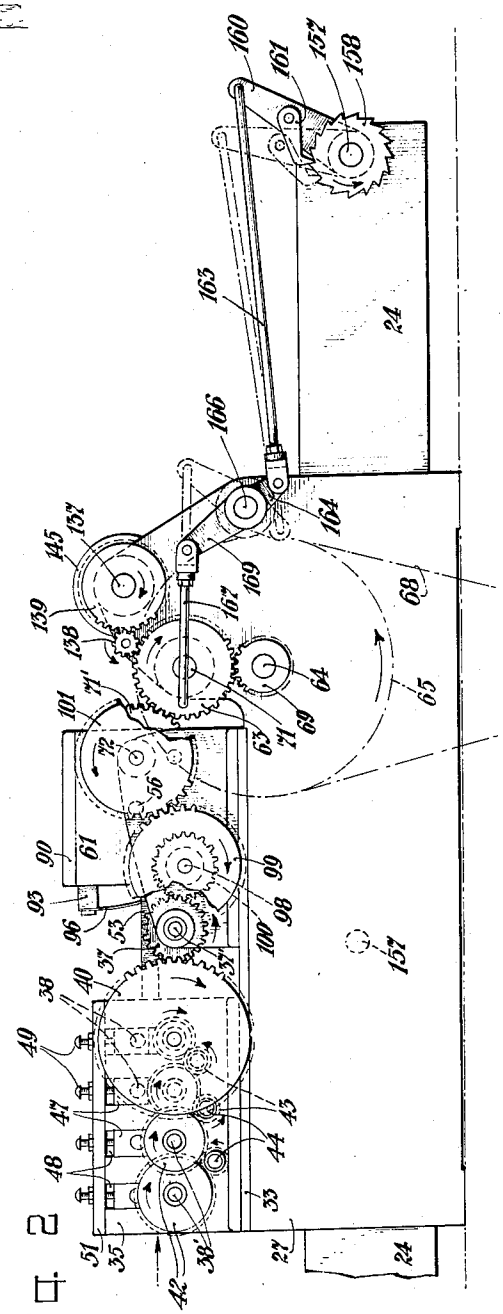


FIG. 2

INVENTOR.
SAMUEL W. GLICKSTON
BY John P. Chandler
his ATTORNEY.

Aug. 26, 1941. S. M. GLICKSTON 2,253,852

SWAB MAKING MACHINE

Filed Dec. 31, 1938 6 Sheets-Sheet 2

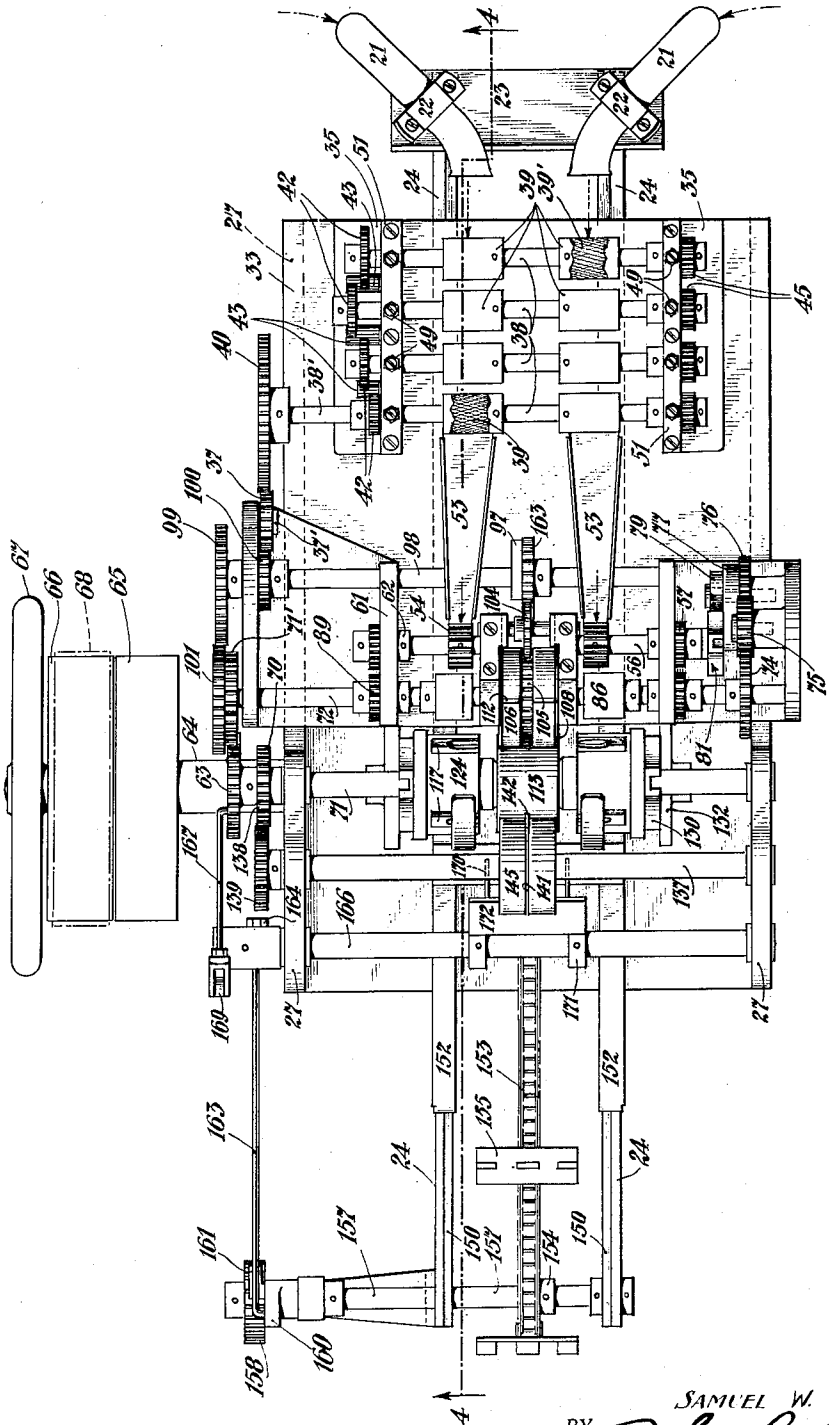


Fig. 3

INVENTOR.
SAMUEL W. GLICKSTON
BY John P. Chandler
his ATTORNEY.

Aug. 26, 1941. S. M. GLICKSTON 2,253,852

SWAB MAKING MACHINE

Filed Dec. 31, 1938 6 Sheets-Sheet 3

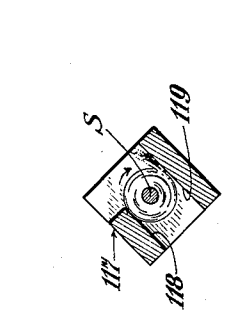


Fig. 8

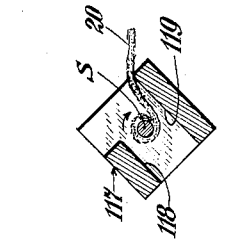


Fig. 7

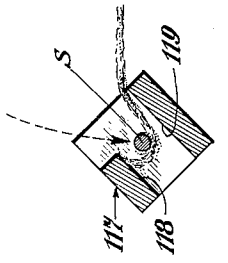


Fig. 6

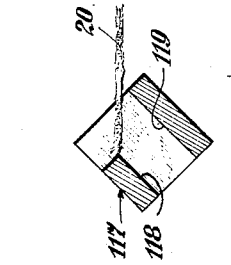


Fig. 5

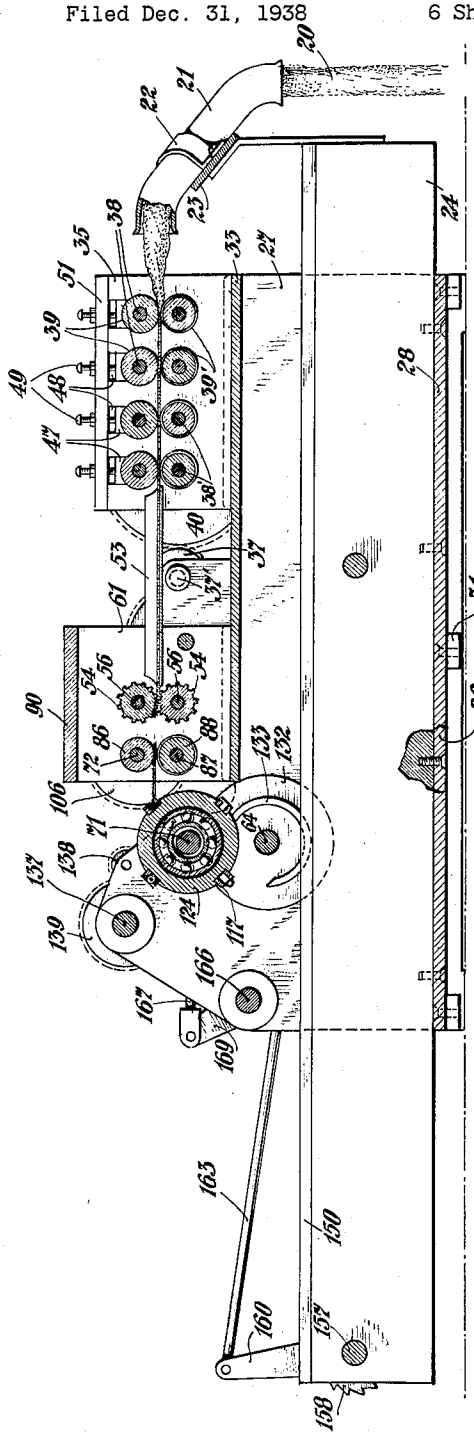


Fig. 4

INVENTOR.
SAMUEL W. GLICKSTON
BY John P. Chandler
his ATTORNEY.

Aug. 26, 1941. S. M. GLICKSTON 2,253,852

SWAB MAKING MACHINE

Filed Dec. 31, 1938 6 Sheets-Sheet 4

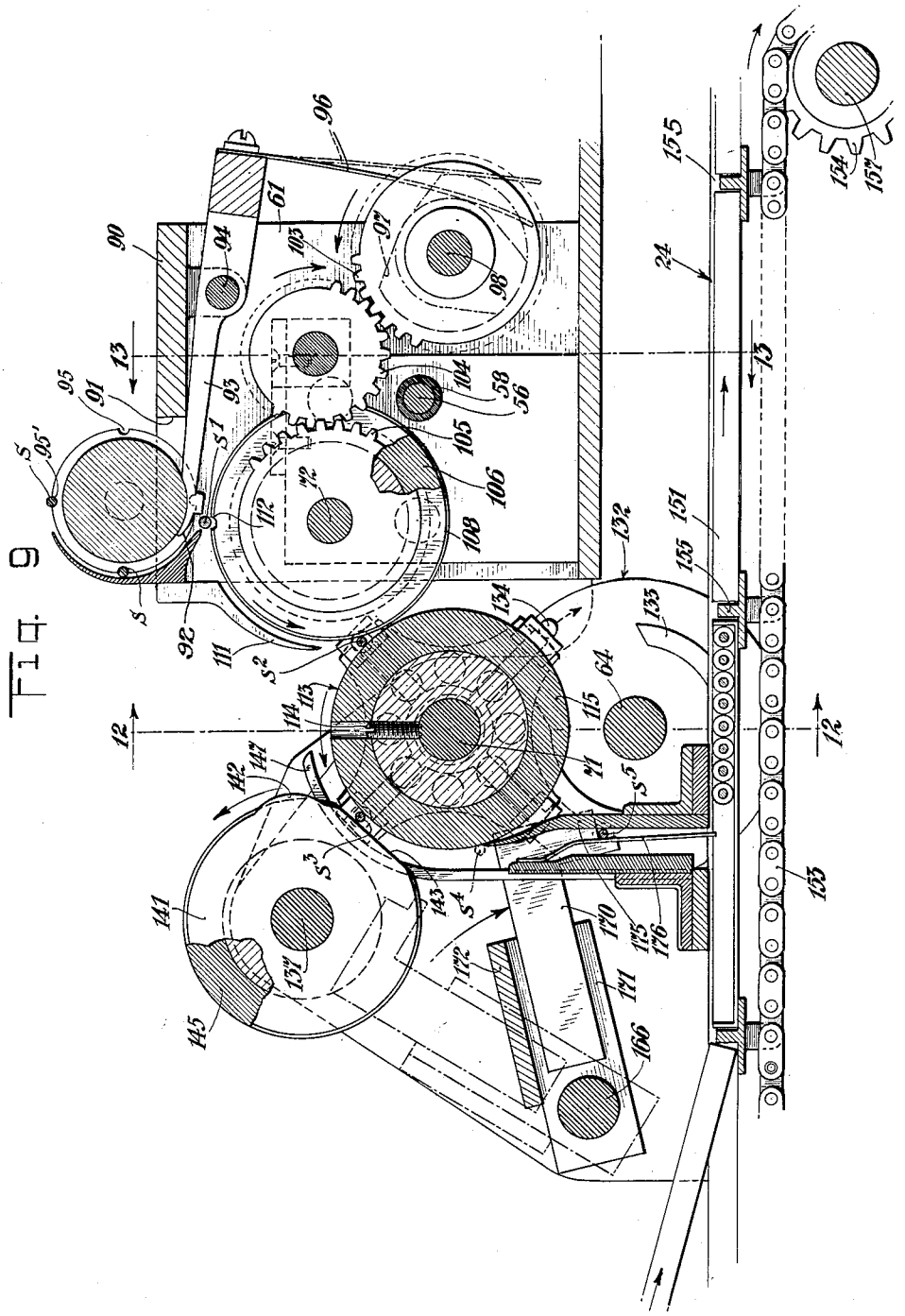


FIG. 9

INVENTOR.
SAMUEL W. GLICKSTON
BY John P. Chandler
his ATTORNEY.

Aug. 26, 1941. S. M. GLICKSTON 2,253,852

SWAB MAKING MACHINE

Filed Dec. 31, 1938 6 Sheets-Sheet 5

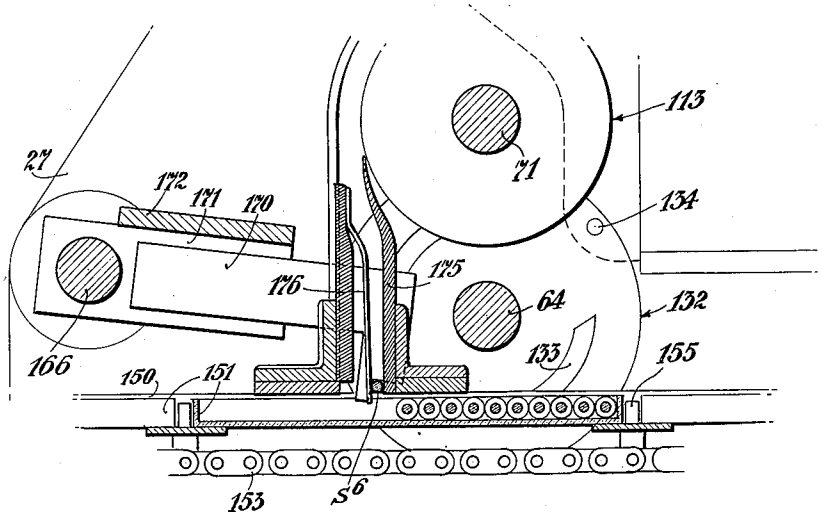


Fig. 10

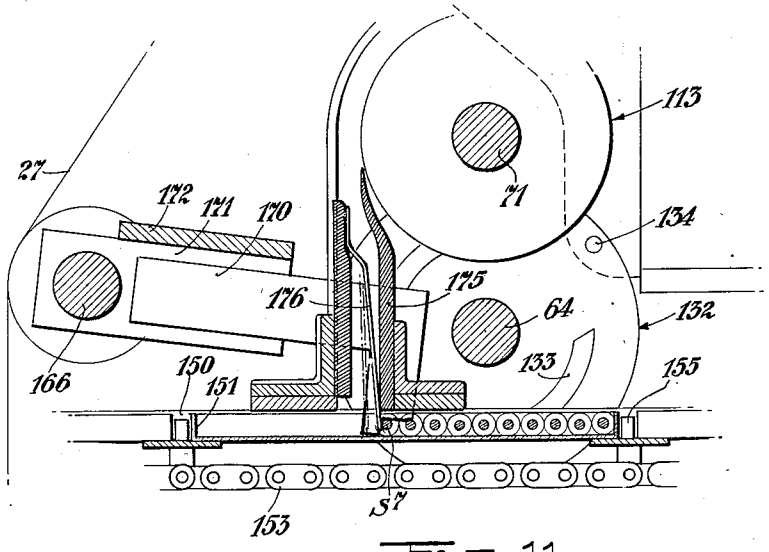


Fig. 11

INVENTOR.
SAMUEL W. GLICKSTON
BY John P. Chandler
his ATTORNEY.

Aug. 26, 1941. S. M. GLICKSTON 2,253,852

SWAB MAKING MACHINE

Filed Dec. 31, 1938 6 Sheets-Sheet 6

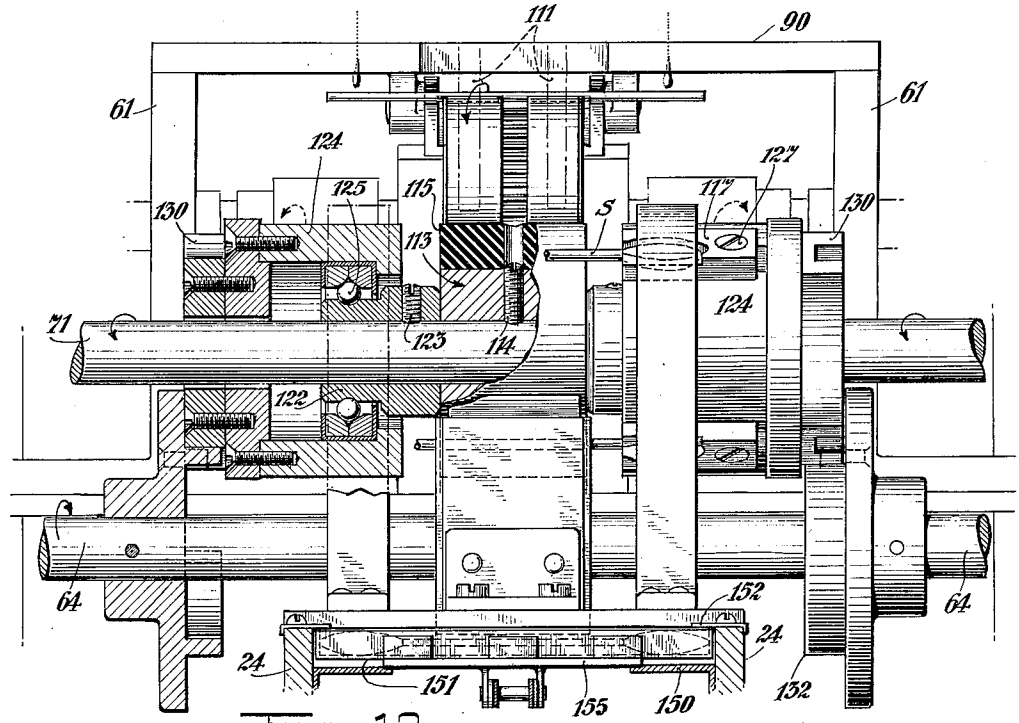


Fig. 12

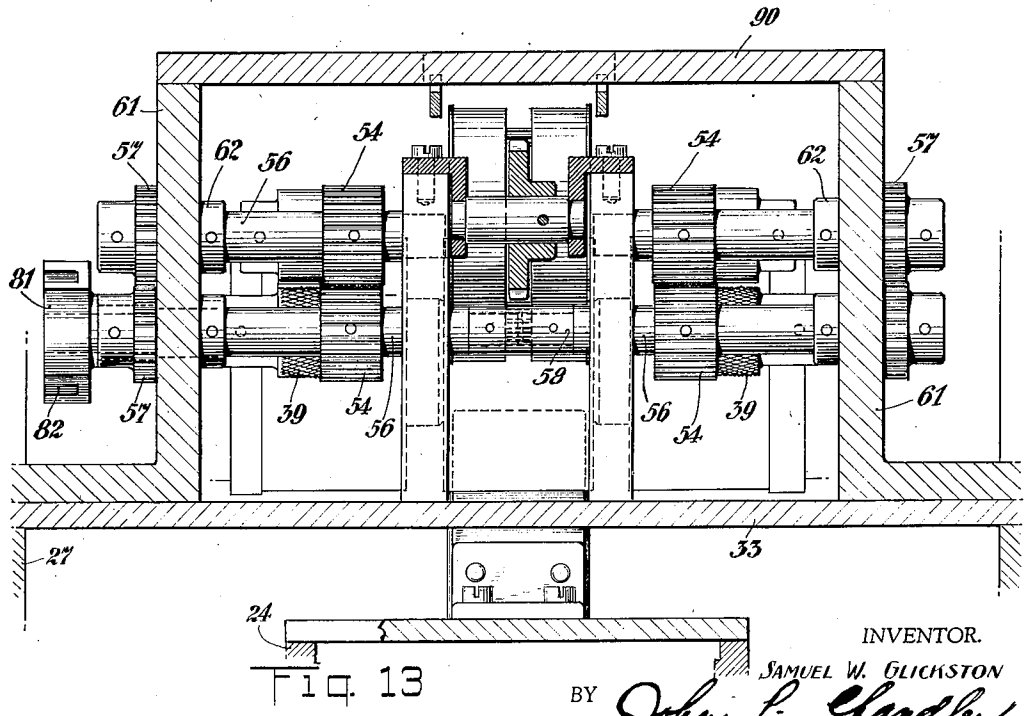


Fig. 13

INVENTOR.
SAMUEL W. GLICKSTON
BY John P. Chandler
his ATTORNEY.

Patented Aug. 26, 1941 2,253,852

UNITED STATES PATENT OFFICE

2,253,852

SWAB MAKING MACHINE

Samuel W. Glickston, Rockville Centre, N. Y., assignor to M. Mayer, New York, N. Y.

Application December 31, 1938, Serial No. 248,764

12 Claims. (Cl. 19—145)

The present invention relates to new and useful improvements in machines for making medical swabs, and relates more particularly to an automatic machine for winding a ribbon of cotton about the end of a stick.

Medical swabs have been formed by hand since time immemorial and it is one of the principal objects of the present invention to provide an automatic machine for making such swabs of far more uniform character than was possible by the hand method. A further object of the invention is the provision of a machine which will form such swabs under sanitary conditions.

Machines for making swabs of this general character have been devised. Such machines, however, for the most part merely form a wad or ball of cotton on the end of the stick by means of moving a wad into the end of a twirling stick, the terminal of the stick piercing the cotton and thus forming the wad. It is quite apparent that a far more satisfactory and uniform type of swab is possible if a thin, relatively fragile ribbon of cotton is in effect held at its terminal to the stick and the ribbon then wrapped therearound.

In my co-pending application Ser. No. 141,274, I have described another machine for making medical swabs of this general type. In this machine a stick was moved into a recess in a shaper or former, the stick forcing the terminal of a ribbon of cotton into the recess as the stick itself passed thereinto. The stick was then held immovable and the former rotated a sufficient number of times to securely wrap the ribbon of cotton therearound. In the present machine, however, the stick is automatically fed to a position between a pair of friction rollers which rotate the stick while a short length of cotton which has been suitably prepared into a fine ribbon, is wrapped therearound. Means are also provided for appropriately stretching and flattening the cotton preparatory to applying it to the stick, which is highly important, since the usual run of cotton ribbon varies considerably in texture and cross-sectional area.

A further object of the invention is the provision of a machine for forming medical swabs which acts entirely automatically and without requiring any human aid.

Yet another object of the invention is the provision of a novel packing mechanism which receives the finished swabs and successively packs the same into boxes in which the swabs are eventually marketed.

Other objects and structural details of the invention will be apparent from the following description when read in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevation of the machine which constitutes the preferred embodiment of the present invention;

Fig. 2 is a broken elevation of the opposite side of the machine shown in Fig. 1;

Fig. 3 is a top plan view of the machine, certain portions thereof having been removed to show the operation of interior parts of the machine;

Fig. 4 is a vertical longitudinal section through a portion of the machine, the view showing certain details of the cotton preparing and severing mechanism;

Fig. 5 is a vertical section taken through substantially the center of the shaper or former, the view showing the position of the strip of cotton relative to the former just prior to the movement of the stick into the former;

Fig. 6 is similar to Fig. 5, and shows initial position of the stick after it has entered the former and the initial position of the cotton relative thereto;

Fig. 7 shows the position of the cotton relative to the stick after the latter has been given approximately one revolution by the friction rollers;

Fig. 8 shows the strip of cotton after the same has been substantially completely wound about the stick;

Fig. 9 is a broken longitudinal vertical section showing details of the stick feeding, cotton winding and stick scoring mechanism;

Figs. 10 and 11 are broken longitudinal sections showing the details of the packing mechanism for the finished swabs;

Fig. 12 is a broken transverse vertical section taken on line 12—12 of Fig. 9; and

Fig. 13 is a broken transverse vertical section taken on line 13—13 of Fig. 9.

The cotton employed in the making of the swabs is a length of either round or substantially flat material and is generally known in the art as "20 to 25 grain stock" and is designated by the reference numeral 20. Inasmuch as each end of the swabs are tipped with the cotton in the present machine, two strands or webs of the cotton are employed, each of which pass through tubes 21, which are secured by means of brackets 22 to a vertical support 23. This support is mounted at the outer terminals of a pair of spaced vertical frame members 24 which run the full length of the device as shown in Fig. 1.

On each side of the frame members 24 and

spaced therefrom are another pair of vertical frame members 27. The lower edges of the members 27 rest upon the support for the entire device and a base plate 28 extends between the members 27 adjacent to the lower edges thereof and is secured thereto by means of bolts 29 passing through angle brackets 31, such brackets also being secured to the members 27.

On the upper edges of the vertical members 27 a plate 33 is mounted, such plate supporting the cotton preparing mechanism. This mechanism comprises a pair of spaced angle members 35, the vertical portions of which provide journals for a plurality of horizontal shafts 38, carrying rollers 39, through which the webs of cotton pass for the purpose of stretching and flattening such cotton. The number of rollers is optional, depending upon the nature of the cotton, four pairs of vertically spaced rollers being shown for each of the two webs of cotton. In each pair of rollers (upper and lower) it is preferable to make one non-smooth or knurled, as shown at 39' in Fig. 3, and the other smooth. The lower forward shaft 38' drives the other shafts 38 and is itself driven by means of an idler 37 mounted on a stud 37' engaging a somewhat larger gear 40, keyed to the shaft 38' (Fig. 2). In order to stretch the cotton to make it into a relatively thin ribbon, each successive shaft 38, approaching the rear of the device is driven slower than the preceding one and means for accomplishing this are shown in Figs. 2 and 3. The driving gears 42, on the lower shafts 38 are made successively larger and each successive gear 42 engages an intermediate idler 43 mounted on the studs, in order to cause each of the shafts 38 to rotate in the same direction. Viewed from the position shown in Fig. 2, the lower shafts 38 all rotate in a clockwise direction and in order to cause the upper shaft 38' to rotate in a counter-clockwise direction, gears 45 are mounted at the opposite ends of all the shafts 38, each lower gear driving its adjacent upper gear (Fig. 1).

The upper set of shafts 38 are journalled in bearing blocks 47 mounted in vertical slots 48, and these shafts are vertically adjustable in order to vary the degree of compression of the cotton between the rollers, the adjustment being accomplished by means of screws 49 mounted in suitable threaded apertures in a cross plate 51 on the upper edge of each vertical frame member 35.

Each web of cotton, while passing through the rollers 39, is appropriately stretched, flattened and is continuously fed over a supporting channel 53 and then passes between a pair of vertically spaced intermittently movable gears 54, the teeth of which have been filed away sufficiently to provide a slight space therebetween as shown in Fig. 4. These gears are mounted on horizontal shafts 56, such shafts being centrally split in order to facilitate their removal when the gears are to be changed. The lower split shaft 56 is driven by means of a four stop Geneva movement, such shaft driving the upper shaft by means of gears 57 as shown in Fig. 13. Since the lower shaft is driven on one side only, the two aligned portions are connected by means of a sleeve 58. The shafts 56 are journalled in the vertical portions of spaced angle members 61, which are mounted on the plate 33, and lateral movement of the shafts is prevented by means of collars 62.

For the sake of clearness, the means for driving the lower shaft 56, as well as the other operative parts of the machine, will now be described, and the motion transmitted from such means will be traced step by step to said shaft 56. A main drive shaft 64, provided with a fixed pulley 65, a freely rotating pulley 66, and a fly wheel 67, is journalled in the opposed vertical frame members 27, which, as shown in Fig. 3, extend the full length of the main operative portion of the machine. The belt for driving the pulleys is shown in broken lines at 68. A gear 69 on the drive shaft 64 drives a gear 63 mounted on another shaft 71 immediately thereabove (Figs. 2 and 3). Thus, gear 63 on the shaft 71 also engages a gear 71' on the shaft 72. A gear 74 mounted at the opposite end of the shaft 72 drives an idler gear 75 which in turn drives a gear 76 mounted on a stud shaft which carries the driver 77 of the Geneva movement for operating the shafts 56.

This Geneva movement is of the conventional type and the driver includes a concentric surface 79 and a roller 80 (Fig. 1). The driven member 81 on the lower shaft 56 is formed with four radial slots 82 positioned 90 degrees apart, and the roller 80 engages one of these slots each time it makes a revolution, thus turning the driven shaft one-quarter revolution. The concentric surface 79 engages the concave surface 84 between each pair of slots before the driving roller is disengaged from the driven wheel, which prevents the latter from rotating while the roller is moving around to engage the next successive slot.

While the machine is in operation the shaft 72 is continuously rotating. The position of shaft 72 relative to shafts 56 is shown in Fig. 4 and the shaft 72 carries a pair of continuously rotating rollers 86 and another shaft 87 immediately therebeneath carries rollers 88. One roller in each pair is desirably non-smooth and the other is smooth as in the case of the cotton preparing rollers 39. The shaft 87 is driven by means of interengaging gears 89 on the shafts 72 and 87. The diameters of the intermittently movable rollers 54 are such that one quarter revolution permits a sufficient length of cotton to pass therethrough during each movement to properly tip one swab. It will accordingly be appreciated that when these rollers cease their motion, the rollers 86 and 88, continuously revolving, sever the length of cotton from the web and deliver it forward to a position to where the stick is applied thereto. Although the cotton as stretched and flattened has a small measure of rigidity, there is nevertheless enough thrust due to the speed of the rollers 86 and 88 to deliver the severed strip to the former without any intermediate support being required.

The specific construction of the hopper for the sticks forms no part of the present invention and any one of several mechanisms may be employed for successively delivering the sticks from the hopper to the friction roller wherein they are carried to the cotton applying position. In any event, the hopper is mounted on the upper edges of the spaced vertical plates 61 and a horizontal plate 90 is mounted between the upper ends of the plates (Fig. 9). The latter plate is provided with a recess 91 within which a cylindrical stick carrying drum 95 having spaced longitudinal recesses 95' for the sticks S is positioned. The drum is intermittently ro-

tated by suitable means and the forward end 92 of a lever 93, pivotally mounted on a shaft 94, projects into a centrally disposed, annular recess (not shown) in the stick carrying drum and as the stick is carried to its lowest position by this drum, the forward end 92 of the lever removes the stick therefrom.

Rocking movement of this lever is accomplished by means of engagement of a flat spring 96 secured to the rear of the lever 93 with a segmental cam 97, mounted on a constantly rotating shaft 98. This shaft is caused to rotate in a counter-clockwise direction by means of a gear 99, mounted at one end thereof, such gear being engaged by a gear 101, mounted at the outer end of the constantly rotating shaft 72 (Fig. 3). A central gear 103, adjacent to the cam 97, engages an idler 104 which in turn engages a gear 105, sandwiched between the two portions of a friction roller 106, made from rubber or other resilient material, the combined friction rollers and central gear being freely mounted on the shaft 72. On each exterior surface of the friction roller 106, a metal disc 108 is secured, such metal discs being of slightly lesser diameter than that of the roller, and there is formed a transverse slot 112 in the discs and in the roller, which receives the stick, such stick being shown at S' (Fig. 9) as it is about to enter such slot.

The operation of these parts is substantially as follows. The intermittently movable stick carrying drum 95 brings a stick from the hopper, through an arcuate path as shown in Fig. 9. As the drum continues to rotate, the forward end 92 of the lever 93 moves into an upward position as shown in Fig. 9, and at this instant the face of the cam 97 engages the spring 96, thereby raising the rear end of the lever 93 and lowering the forward end thereof. The stick is thus removed from the drum and as the lever descends, the stick drops into the recess 112 in the friction roller, which as previously stated, is continuously rotating.

The stick is shown at S' just before entering the recess. The stick is prevented from falling from the recess during its arcuate movement by means of a curved guide plate 111.

The stick ceases its arcuate movement at S^2 and the stick is rotated and the cotton now applied in the following manner. The constantly rotating shaft 71 carries a second friction roller 113, which is keyed thereto by means of a set screw 114, the roller having a resilient covering 115 (Fig. 12). This second friction roller is only slightly spaced from the first roller, as shown in Fig. 9, and since both rollers are of the same size and are rotating in the same direction at constant speed (the two meeting surfaces of the rollers moving, of course, in opposite directions), there is a tendency for the stick to stay in the position indicated at S^2. It is actually prevented from continuing its arcuate movement, however, by means of the recessed shapers or formers 117, the shape of which is shown in detail in Figs. 5 to 8. Each former has curved spaced inner walls 118 and 119, the wall 119 having a somewhat greater depth than the wall 118. A general top plan view of this opening in the former is shown in the right hand former assembly in Fig. 12.

Four of such formers are carried on each side of the friction roller 113, and the entire roller assembly, which is intermittently driven through an arc of 90 degrees, is shown in detail in Fig. 12. A collar 122 is secured to the shaft 71 by means of a set screw 123. Another collar or annular support 124 is freely mounted for rotative movement on the fixed collar 122, ball bearing 125 being positioned therebetween. Each former 117 is secured to the collar 124 in its equally spaced relation, by means of a screw 127. At the opposite end of the collar 124 a four stop driven Geneva element 130 is secured.

The driver for this element is shown at 132 in Fig. 9, and is keyed to the constantly rotating main drive shaft 64 and includes a concentric surface 133 and a driving roller 134. Thus, as the driver rotates, it intermittently moves the former support or collar 124 through arcs of 90 degrees and successively positions the individual formers at a point just above the point of substantial meeting of the two friction rollers 106 and 113. The formers are mounted on the support in such a manner that their inner walls are substantially radially disposed relative to the center of the shaft 71.

The stick S, which is positioned within the transverse recess 112 in the friction wheel 106, is brought through its arcuate path to the position shown at S^2 (Fig. 9). The cotton feeding and severing mechanism has, just prior to this, severed a ribbon of cotton from the web and has delivered it to a position relative to the former which is shown in Fig. 5. Once the cotton is there, the stick descends, following the course shown by the arrow in Fig. 6, thus forcing the forward end of the ribbon into the former. Rotation of the stick commences immediately since the friction rollers 106 and 113 are constantly rotating. By the time the rollers have made one complete revolution, the stick has been rotated many times and the swab is now formed.

The Geneva driver again advances the former assembly, carrying the finished swab, through an arc of 90 degrees to the stick scoring mechanism. This includes a shaft 137 which is also journalled in the vertical frame members 27 and is driven constantly by means of the gear 70 on the shaft 71, an intermediate idler 138 engaging a gear 139 on the shaft 137. The scoring is performed by means of a cutter comprising a metal disc 141 having a cutting portion 142 and a flat portion 143. The disc is positioned between two portions of a third friction roller 145 which, together with the disc 141, is keyed to the shaft 137. This friction roller has a slightly larger diameter than the metal disc, except for the cutting portion 142. A curved guide plate 147 prevents the swab from leaving the former during its movement to the cutter. Adjacent to the flat portion 143 of the disc the roller 145 is also flat to permit the stick to be moved into and out of the position between the friction rollers shown in Fig. 9. Continued rotation of the rollers causes the stick to rotate, the cotton tipped ends still being within the two opposed formers, and as the roller 145 finishes its complete revolution the knife portion lightly makes an annular scoring, not sufficient to materially weaken the stick, but merely enough to cause a clean break when the stick is manually severed.

Another operation of the Geneva driver brings the completed swab down to the point indicated as S^4. The following automatic means are provided for ejecting the swab from the formers at this point, and for causing it to fall into the container in which it is eventually marketed.

Angles 150 are mounted adjacent to the upper edges of the vertical frame members 24 (Fig. 12), the horizontal portions of which act as slideways for opposite sides of small boxes 151 of sufficient height to receive one layer of the finished swabs. A plate 152 may be secured by screws to the upper surface of the frame members. The boxes are intermittently moved as the swabs are fed thereinto by means of an endless conveyor chain 153 mounted between sprockets 154. At suitably spaced intervals, carrier lugs 155 are mounted on links of the chain, such lugs also supporting the boxes as shown in Fig. 9.

The outer sprocket 154 is keyed to a shaft 157 also carrying a ratchet wheel 158 thereon. Intermittent movement of the conveyor chain is caused by means of a lever 160 carrying a pawl 161 thereon, engaging the teeth of the ratchet wheel. Reciprocating movement of the lever 160 is obtained by a lever 163 secured at its opposite end to one arm 164 of a bell crank lever centrally pivoted on and keyed to a shaft 166. A lever 167 is eccentrically secured at one end to the opposite arm 169 of the bell crank and the other end of this lever is eccentrically secured to the constantly rotating gear 63.

Thus the levers 167 and 163 are constantly reciprocating, the latter driving the conveyor chain 153 and the former driving a pair of spaced fingers 170 mounted on a pair of supports 171, keyed to the shaft 166, the supports having a crosspiece 172 therebetween. The swabs are removed from the formers by means of a vertical finger 175, the upper end of which is only slightly spaced from the friction roller 113. The swab thus falls to the position shown at S^5 in Fig. 9, where its downward movement is arrested by means of a flat spring 176 urging the swab in the direction of the finger 175. At this time the two spaced fingers 170 begin to descend, thus pushing the swab evenly downward as shown at S^6 in Fig. 10. Further downward movement positions the swab in the box 151 adjacent to the one which has just preceded it.

If desired, the swabs may be medicated after they are formed and any conventional means may be employed to cause drops of an antiseptic solution upon the swabs. Also, a suitable adhesive, which may, if preferred, be antiseptic in character, can be applied to the ends of the sticks before the cotton is wrapped therearound. Fig. 12 shows drops of such adhesive descending upon the stick.

While I have described what I consider to be a highly desirable embodiment of my invention, it is obvious that many changes in form could be made without departing from the spirit of the invention. For instance, the present machine is adapted to form the swab over each end of the stick, although in some instances, particularly wherein a longer stick is required, the machine may be slightly modified in order to form the swab over one end only. It will also be apparent that the cotton preparing and conditioning rollers might in some instances be eliminated entirely, particularly in the event that it should become possible to secure cotton of the proper fineness and texture. It will further be obvious that the swab withdrawing and packing mechanism could be employed in connection with machines other than the swab making machine described in the instant application.

What I claim is:

1. A swab making machine comprising a shaper having a recess therein, means for successively positioning lengths of cotton or the like adjacent to said recess, means for successively causing sticks to engage the cotton and move both into the recess, means for rotating the stick while so positioned, thus winding the cotton about the stick, and means for discharging the stick with the cotton thereon from the recess in the shaper.

2. A swab making machine comprising a shaper having a recess therein, means for successively positioning lengths of cotton or the like adjacent to said recess, means for successively causing sticks to engage the cotton and move both into the recess, means for rotating the stick while so positioned, thus winding the cotton about the stick, and means for transporting such sticks into a container, said means comprising a movable support for the shaper, means for moving the support into a discharging position after the swab has been formed on the stick, means for withdrawing the stick from the shaper when in discharging position, causing the same to fall into the container and an intermittently movable conveyor supporting the container.

3. A machine for making swabs comprising a pair of friction rollers, means for positioning a stick between such friction rollers to cause the same to rotate and means for wrapping a ribbon of cotton or the like about the terminal of the stick, said means comprising a shaper having a recess therein, means for positioning said length of cotton adjacent to the recess, the shaper being so positioned relative to the friction rollers as to cause the terminal of the stick to move into, and position the cotton within, the recess as the stick is moved into operative position relative to the rollers.

4. A swab making machine comprising a shaper having a recess therein, means for feeding the terminal of a web of cotton beyond the recess and means for severing the cotton from the web, means for grasping and transporting a stick, causing it to engage the cotton and move both cotton and stick into such recess, and means for rotating the stick while so positioned, thus wrapping the cotton about the end of the stick, and means for discharging the swab from the shaper.

5. A swab making machine comprising a shaper having an elongated recess therein, means for feeding the terminal of a web of flattened cotton beyond the recess and means for severing the cotton from the web, means for grasping and transporting a stick, causing it to engage the cotton adjacent to its forward terminal and move both cotton and stick into such recess, and means comprising a pair of friction rollers for rotating the stick while so positioned, thus wrapping the cotton about the end of the stick, and means for discharging the swab from the recess and depositing the same in a container.

6. A swab making machine comprising a shaper having an elongated recess therein, means for feeding the terminal of a web of flattened cotton beyond the recess and means for severing the cotton from the web, said latter means comprising a pair of feeding rollers and means adjacent to the feeding rollers for intermittently gripping the cotton to cause severance thereof, means for grasping and transporting a stick, causing it to engage the cotton adjacent to its forward terminal and move cotton and stick into such recess, and means comprising a pair of friction rollers for rotating the stick while so positioned, thus wrapping the cotton about the end of the stick, means for scoring the stick intermediate its ends and means for discharging the swab from the re-

cess and depositing the same in a container and a conveyor for imparting intermittent movement to the container as the successive swabs are deposited therein.

7. A machine for making medical swabs comprising, in combination, cotton conditioning and severing means, stick delivering and stick rotating means and means for discharging and packing the completed swabs in containers, said conditioning means comprising a plurality of spaced pairs of rollers between which a web of cotton is adapted to pass to flatten the same, the forward pair of rollers rotating further than the next succeeding pair for the purpose of stretching the same, the severing means comprising a pair of constantly rotating rollers and a pair of intermittently rotating rollers to the rear of the former rollers, a suitable length of cotton being severed when the latter rollers cease rotation, a rotatable support and a plurality of recessed shapers mounted on said support, means for grasping and transporting a stick and moving the terminals thereof as well as the severed cotton into the recess in a shaper, a pair of friction rollers for rotating the stick while in such recess, thereby forming the swab.

8. A machine for making medical swabs comprising a shaper having a recess therein, means for forming a web of cotton into a flattened, attenuated ribbon comprising a plurality of pairs of rollers revolving at different speeds and through which the cotton is fed, means for delivering a severed length of such ribbon to a position wherein a portion thereof overlies said recess, such means comprising a pair of intermittently revolving rollers and a pair of continuously revolving rollers in advance thereof, and through which the cotton is fed, means for transporting a stick and moving a terminal thereof into engagement with said ribbon and into the recess, means for revolving the stick while its terminal and the ribbon are positioned within the recess, thus winding the ribbon about the terminal to form a swab end, and means for discharging the finished swab from the recess.

9. A machine for making medical swabs comprising a shaper having a longitudinal recess therein, such recess conforming in cross sectional area to the shape of the finished swab, means for forming a web of cotton into a flattened, attenuated ribbon, means for delivering a severed length of such ribbon to a position wherein a portion thereof overlies said recess, means for transporting a stick and moving a terminal thereof into engagement with said ribbon and into the recess, means comprising a pair of friction rollers revolving in the same direction for revolving the stick while its terminal and the ribbon are positioned within the recess, thus winding the ribbon about the terminal to form a swab end, and means for discharging the finished swab from the recess.

10. A machine for making medical swabs comprising a shaper having a recess therein, means for forming a web of cotton into a flattened, attenuated ribbon, means for delivering a severed length of such ribbon to a position wherein a portion thereof overlies said recess, means for transporting a stick and moving a terminal thereof into engagement with said ribbon and into the recess, means for revolving the stick while its terminal and the ribbon are positioned within the recess, thus winding the ribbon about the terminal to form a swab end, a conveyor positioned beneath the shaper and adapted to convey a container in step by step movement, and means for discharging the finished swab from the shaper into the container.

11. A machine for making medical swabs comprising a shaper having a recess therein, means for forming a web of cotton into a flattened, attenuated ribbon, means for delivering a severed length of such ribbon to a position wherein a portion thereof overlies said recess, means for transporting a stick and moving a terminal thereof into engagement with said ribbon and into the recess, means for revolving the stick while its terminals and the ribbon are positioned within the recess, thus winding the ribbon about the terminal to form a swab end, a conveyor positioned under the shaper, means on the conveyor for supporting a plurality of containers, means for imparting intermittent step by step motion to the conveyor, means for withdrawing the swab from the shaper and means for guiding the swab in its movement from the shaper to the container.

12. A machine for forming a swab about each end of a stick comprising a pair of shapers having recesses therein, means for forming webs of cotton into flattened, attenuated ribbons, means for delivering severed lengths of such ribbons to a position wherein a portion thereof overlies said recesses, means for transporting a stick and moving the terminals thereof into engagement with said ribbons and into the recesses, means for revolving the stick while its terminals and the ribbons are positioned within the recesses, thus winding the ribbons about the terminals to form a swab end, and means for discharging the finished swab from the recesses.

SAMUEL W. GLICKSTON.