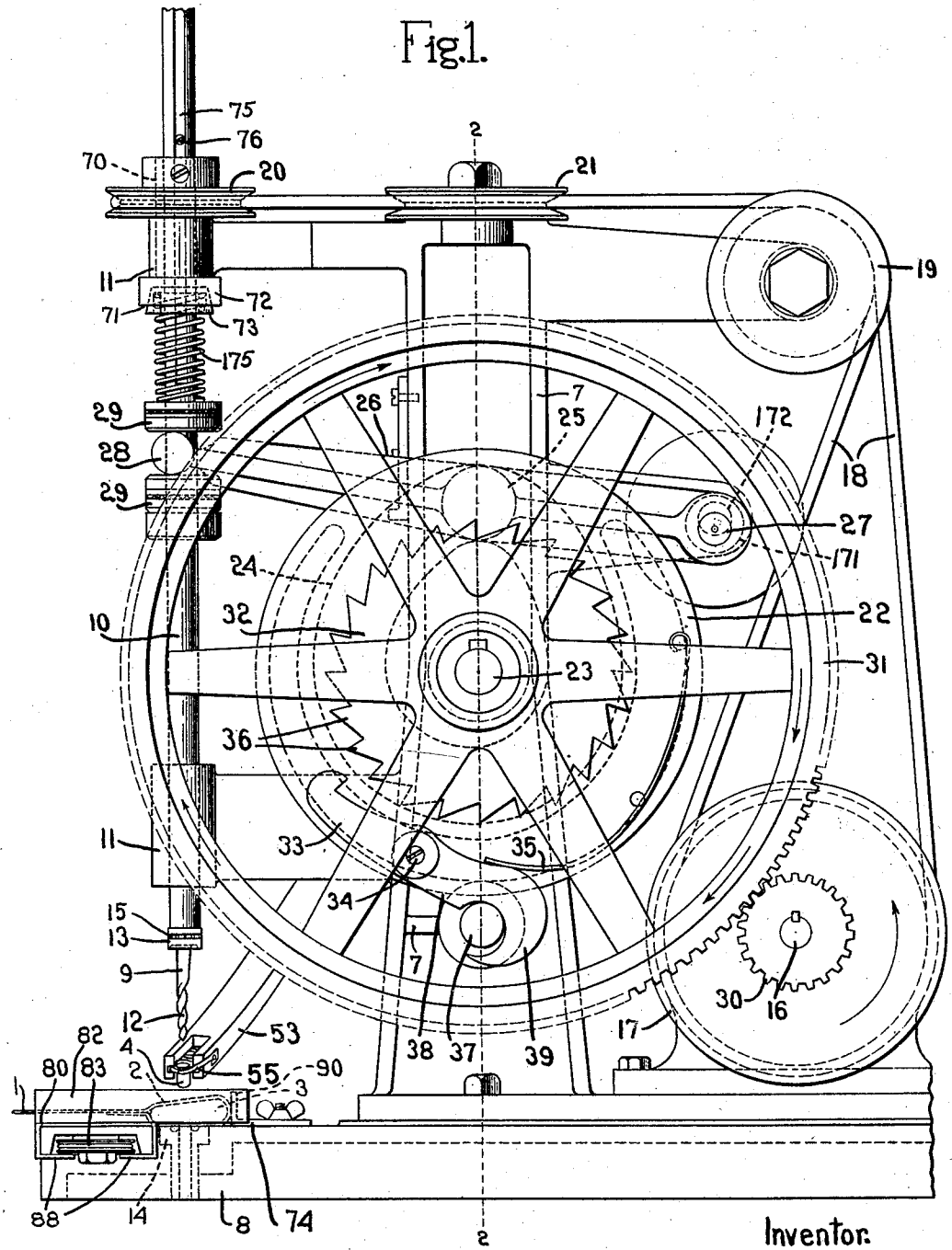
May 24, 1932. C. N. COLPITTS 1,859,959

MACHINE FOR INSERTING EYELETS IN WINDOW SHADES AND THE LIKE

Filed Sept. 22, 1930 5 Sheets-Sheet 1

Fig. 1.



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MACHINE FOR INSERTING EYELETS IN WINDOW SHADES AND THE LIKE

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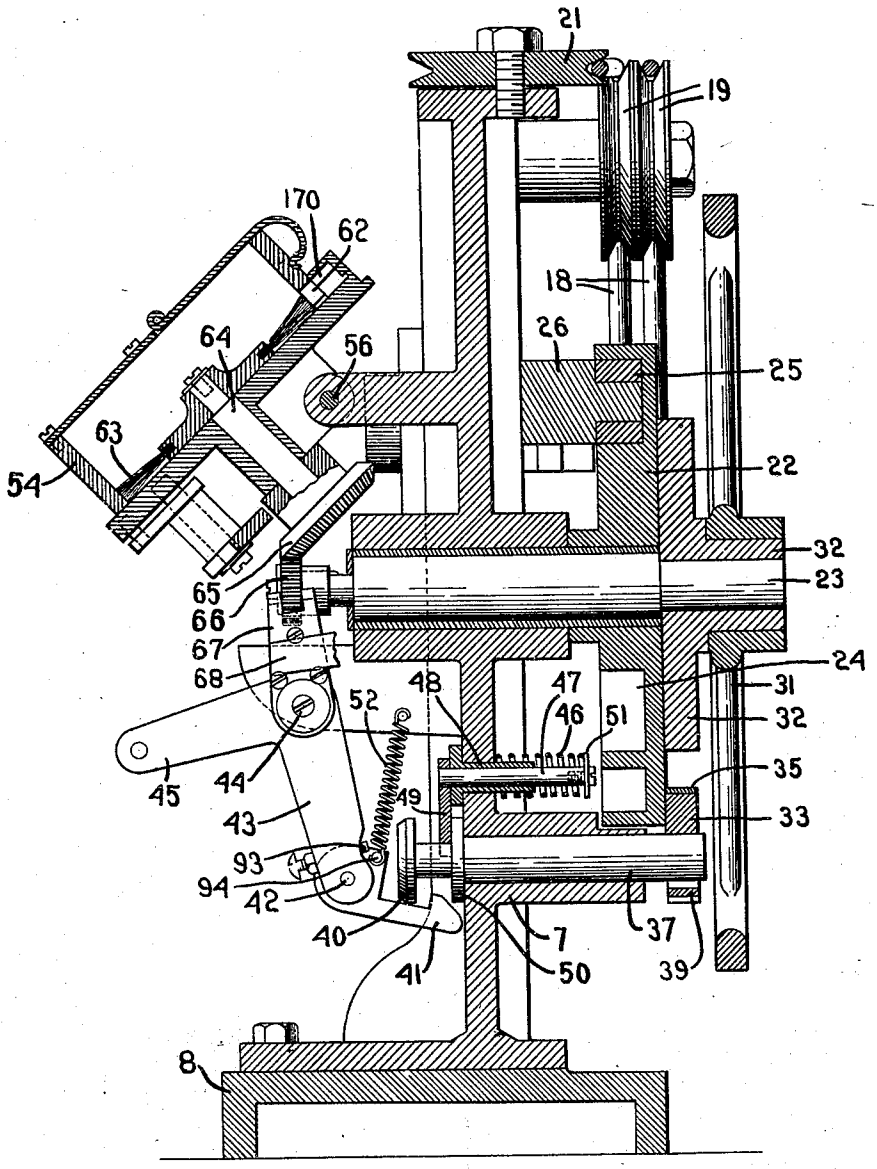
Fig. 2.



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MACHINE FOR INSERTING EYELETS IN WINDOW SHADES AND THE LIKE

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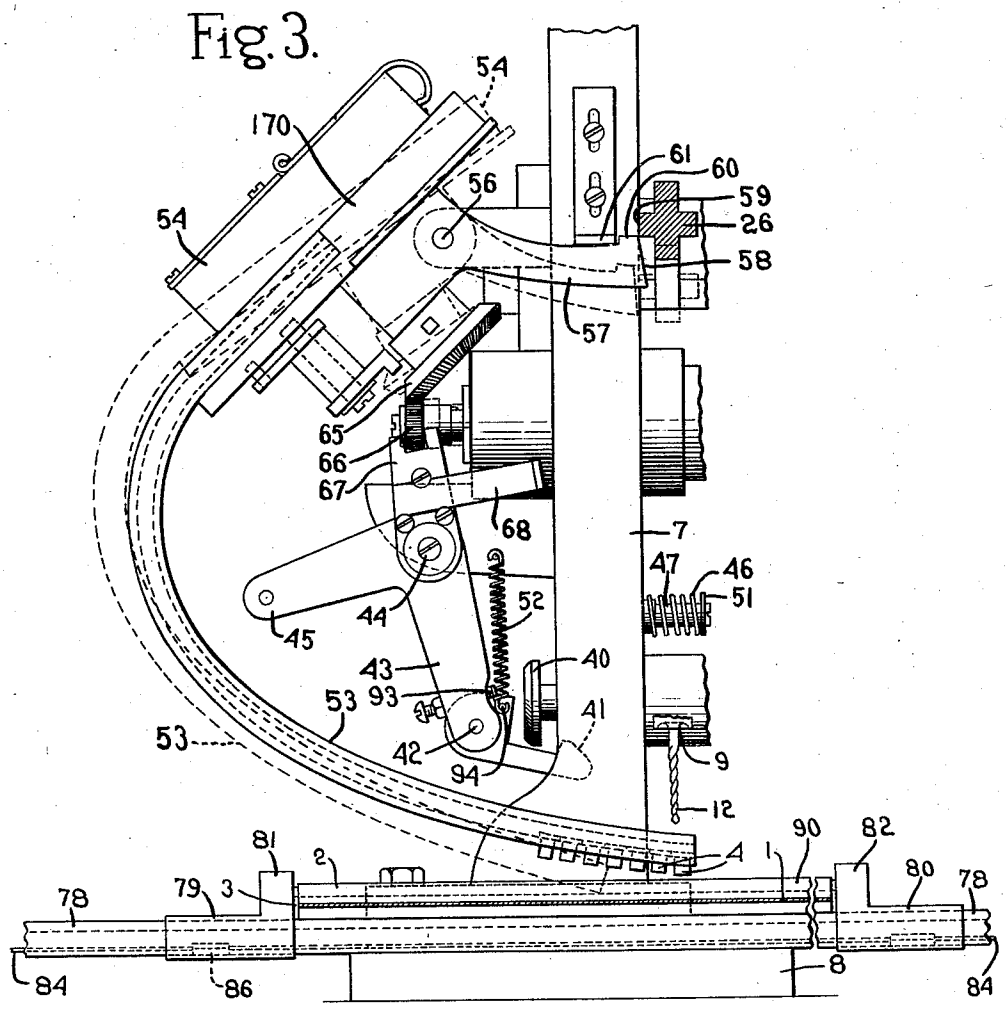
Fig. 3.



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MACHINE FOR INSERTING EYELETS IN WINDOW SHADES AND THE LIKE

Filed Sept. 22, 1930 5 Sheets-Sheet 4

Fig.4.

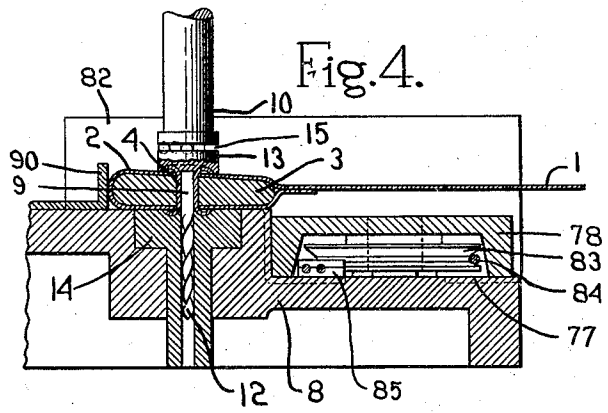


Fig.5

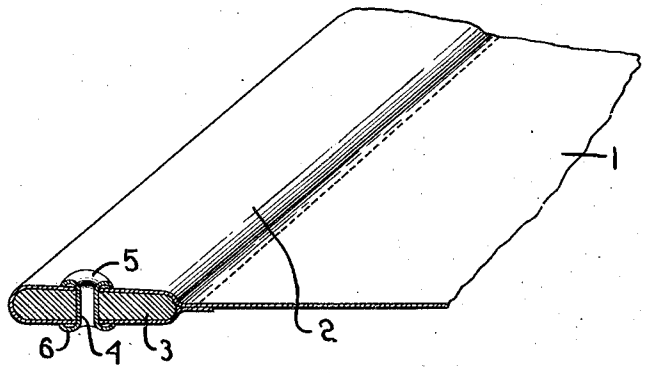
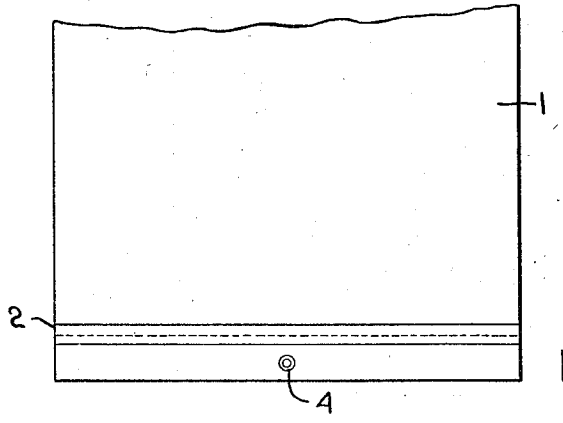


Fig.6.



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MACHINE FOR INSERTING EYELETS IN WINDOW SHADES AND THE LIKE

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Fig. 7.

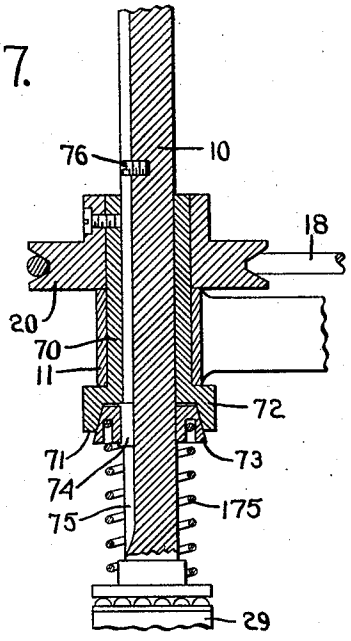


Fig. 8.

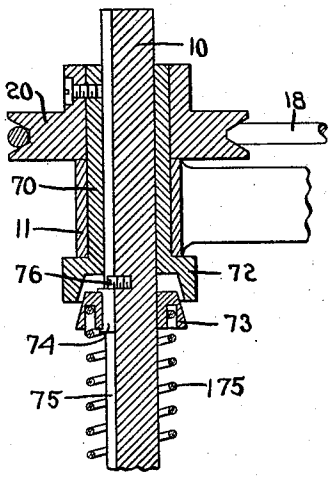


Fig. 9.

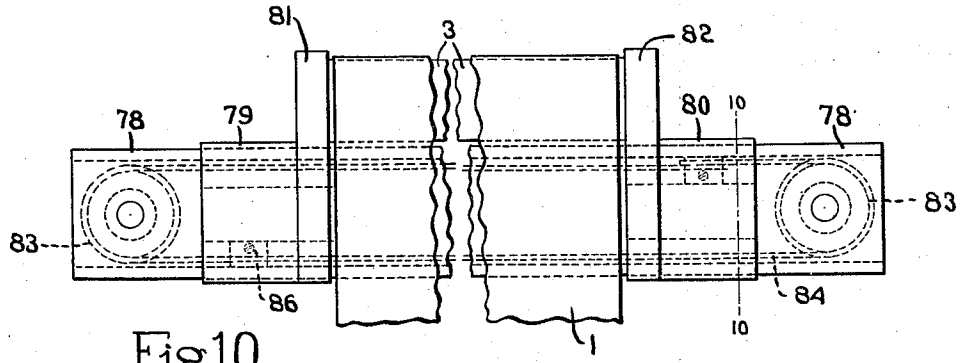
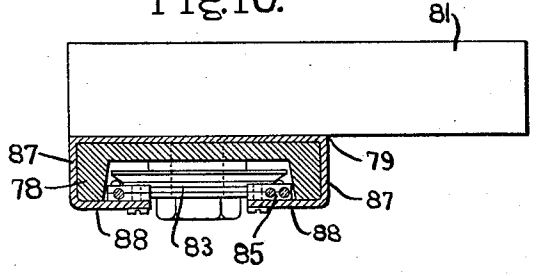


Fig. 10.



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Patented May 24, 1932 1,859,959

UNITED STATES PATENT OFFICE

CALVIN N. COLPITTS, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO AMERICAN WINDOW SHADE MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

MACHINE FOR INSERTING EYELETS IN WINDOW SHADES AND THE LIKE

Application filed September 22, 1930. Serial No. 483,416.

In the manufacture of window shades it is customary to place a wooden stick in the hem at the lower end of the shade and then to insert a grommet or eyelet through the stick in order to provide for attaching the pull cord to the curtain. The insertion of the grommet or eyelet involves the operation of drilling a hole through the wooden stick and then the insertion and setting of the eyelet.

It is the object of my present invention to provide a novel machine by which the drilling of the hole and the setting of the eyelet are accomplished by the same mechanism and at the same time.

The invention includes a combined drilling and eyelet-setting tool which operates during its initial operative movement to drill the hole for the eyelet and during its final operative movement to set the eyelet. In order to give an understanding of my invention, I have illustrated herein a selected embodiment thereof which will now be described, after which the novel features will be pointed out in the appended claims.

In the drawings:

Fig. 1 is a side view of a combined drill and eyelet setting machine embodying my invention.

Fig. 2 is a section substantially on the line 2—2 Fig. 1.

Fig. 3 is a fragmentary sectional view illustrating the means for withdrawing the eyelet-delivery chute for discharging an eyelet therefrom.

Fig. 4 is an enlarged sectional view showing the operation of setting the eyelet.

Fig. 5 is a fragmentary sectional view of the end of the curtain showing the eyelet therein.

Fig. 6 shows the completed curtain.

Fig 7 is a fragmentary sectional view showing the clutch mechanism for driving the drill;

Fig. 8 is a similar view showing the way in which the clutch is disengaged while the eyelet is being set;

Fig. 9 is a fragmentary view partly broken out showing the positioning gauge for the curtain;

Fig. 10 is an enlarged section on the line 10—10, Fig. 9.

Referring first to Fig. 5, 1 indicates a window shade of ordinary construction which is provided at its lower end with the usual hem 2 in which is inserted the wooden stick 3. As stated above it is common practice to insert an eyelet through the stick 3 in order to provide an opening to which a pull cord may be secured. In Fig. 5, 4 indicates such an eyelet, it having the usual head 5 at one end and being clinched over as shown at 6 at the other end thereby locking it in place. The insertion of an eyelet of this sort necessitates first drilling a hole through the stick 3, and as stated above the present invention has for its object to provide a novel machine which will at one operation drill the hole for the eyelet and set the eyelet.

The machine comprises a suitable frame 7 having a base or work support 8 on which the end of the curtain is supported. The drilling of the hole for the eyelet and the setting of the eyelet is accomplished by a combined drill and eyelet-setting tool 9 which is mounted on a rotary spindle 10 that is slidable vertically in suitable bearings 11 and carried by the frame. This tool comprises a drill member 12 which is adapted to drill the hole through the stick 3 and a setting member 13 mounted on the stem of the drill and adapted to co-operate with an anvil member 14 carried by the bed 8 for setting the eyelet.

In the operation of the machine, when the drill is lowered into operative position to drill the hole, it will pass through an eyelet which is properly positioned to receive the drill and as the drill proceeds the eyelet slides up the drill until it engages the setting member 13. When this occurs the continued downward movement of the drill spindle 10 carries the eyelet into the hole which has been drilled and the co-operation of the setting member 13 and the anvil member 14 serves to set the eyelet by clinching over the lower end thereof as shown at 6 in Fig. 5. The anvil member 14 is made hollow or tubular to permit the drill to pass therethrough as the eyelet is being set.

The setting member 13 is loosely mounted on the spindle of the drill and a suitable ball bearing 15 is provided for said member.

Means are also provided for unclutching the drill shaft from its driving means while the eyelet is being set so that at this time the drill will not be rotating.

The drill spindle 10 may be given its rotary and vertical movement in any approved way. As herein shown it is operated from a drive shaft 16 which is mounted in bearings on the frame and is driven from any suitable source of power. This shaft has a belt pulley 17 thereon over which runs a belt 18 for rotating the drill spindle. This belt passes over two direction pulleys 19 and around a pulley 20 which is made fast to a sleeve 70 that is journalled in the upper bearing member 11. The drill spindle 11 extends through the sleeve 70 and is adapted to be clutched thereto by a suitable clutch indicated generally at 71.

21 indicates another direction pulley engaging one run of the belt and operating to maintain said run in proper alignment with one of the pulleys 19.

For giving the spindle 10 its vertical movement I have provided a cam member 22 which is mounted on stud or shaft 23 carried by the frame, said cam member having a cam groove 24 in which is received a follower 25 carried by a lever 26, said lever being pivotally mounted at 27 and having at its free end a forked portion 28 which embraces the spindle 10 and is received between two collars 29 on the spindle. The cam 22 derives its rotation from the shaft 16 and means are provided whereby the operative connection between the shaft 16 and the cam 22 will be disrupted after each complete excursion of the drill spindle. The shaft 16 has a pinion 30 fast thereto which meshes with a large gear 31 which is fast on the hub of a ratchet member 32 which in turn is keyed to the shaft 23.

The cam member 22 has pivoted thereto at 34 a pawl member 33 which is adapted to co-operate with the ratchet teeth 36 formed on the ratchet member 32. Said pawl is acted on by a spring 35 which tends to throw it into engagement with said ratchet teeth and when said pawl is in engagement with the ratchet teeth the gear 31 will be coupled to the cam so that the latter will be driven by the gear.

When the drill spindle has made one complete excursion and has been elevated into the position shown in Fig. 1, the pawl is automatically disconnected from the ratchet thereby disrupting the driving connection between the gear 31 and the cam 22.

This is accomplished by means of a clutch pin 37 which is slidably mounted in the frame and which, when in its operative position, will engage the under face 38 of the rear end of the pawl as the cam is rotated thereby to swing said pawl out of engagement with the ratchet teeth 36. The pawl is provided with a hook-shaped end 39 that engages the pin and positively arrests the movement of the cam in a determined position.

To start the machine in operation the pin 37 is moved to the left Fig. 2 thereby to withdraw it from engagement with the pawl and as soon as this occurs, the spring 35 acts to swing the pawl into operative engagement with the ratchet teeth 36 thereby coupling the gear 31 to the cam 22.

The pin 37 may be controlled manually in any approved way. As herein shown the said pin is provided at one end with a head 40 adapted to be engaged by a latch 41 pivotally mounted at 42 to an elbow-lever 43, the latter being pivoted to the frame at 44. The arm 45 of the elbow-lever is connected to a suitable treadle or other control adapted to be manually operated.

When the elbow lever 43 is swung clockwise Fig. 2 by the operation of the treadle the pawl 41 will engage the head 40 of the pin 37 and move the latter to the left Fig. 2 thereby withdrawing up from the pawl 33. The pawl will then be swung into operative engagement with the ratchet teeth 36 by the spring 35 as above described so that the rotation of the gear 31 will be communicated to the cam and the drill will be given its downward movement.

Means are provided for restoring the pin 37 to its normal position as soon as the cam 22 starts its rotating movement so that the pin will be in position to disengage the pawl 33 when the cam completes its movement. The pin is normally held in its operative movement by means of a spring 46 which is shown as encircling a pin 47 slidable in a bearing 48 and having at one end a head 49 that engages a collar 50 on the pin 37. The sliding pin 47 has the collar 51 at one end against which the spring 46 bears. When the pin 37 moves to the left as above described the engagement of the collar 50 with the head 49 moves the pin 47 to the left thereby compressing the spring 46.

Means are provided for disengaging the latch 41 from the head 40 as soon as the pin 37 has been entirely withdrawn from the latch 33 so that the compressed spring 46 will function to restore the pin 37 to its normal position. The latch 41 is acted on by a spring 52 which normally holds it in position against the head 40. The elbow lever 43 carries a knock-off screw 93 which is adapted to engage a pin 94 carried by the latch 41 when the arm 43 swings to the left. The continued swinging movement of the arm 43 to the left after the knock-off screw 93 engages the pin 94 will cause the latch 41 to swing downwardly sufficiently to be released from the head 40 thereby allowing the spring 46 to return the pin 37 to its normal position. Hence when the treadle is operated to give the

elbow lever 43, 45 its rotative movement in a clockwise direction, the initial movement will withdraw the pin 37 from engagement with the pawl 33 and during the final movement the latch 41 will be disconnected from the head 40.

The eyelets 4 are delivered to the drill through a raceway 53 which extends from a magazine 54. At the lower end of the raceway is a yieldable stop 55 situated to engage the bottom eyelet and yieldingly retain the same in position directly underneath the drill. When the drill is depressed, therefore, it passes through the bottom eyelet and as the drill enters the eyelet the raceway is swung backwardly into the dotted line position Fig. 3 during which movement the end eyelet which has been penetrated by the drill is withdrawn from the raceway by the drill.

The yielding stop 55, which is in the nature of a spring finger, will yield to permit the eyelet to pass out of the raceway during the backward movement of the latter. As the eyelet is withdrawn from the raceway the drill continues its downward movement thereby drilling the hole in the stick, during which operation the eyelet rests on the end of the curtain and as the drill completes its movement and the setting member 13 engages the eyelet the latter will be pushed through the stick and will be set.

As the drill is raised into its elevated position the raceway again returns to its full line position Fig. 3 thereby bringing the end eyelet in position directly underneath the drill ready for the next operation.

The raceway is rigid with the magazine 54 and the latter is pivotally mounted on the frame as shown at 56. The magazine has rigid therewith an arm 57, the end 58 of which is in the nature of a cam face adapted to be engaged by a projection 59 formed on the lever 26 when the latter swings downwardly.

Thus at each downward movement of the lever by which the drill is given its operative movement, the projection 59 engages the end 58 of the arm 57 and swings the latter downwardly as shown by dotted lines Fig. 3. Since this arm is rigid with the magazine and since the magazine and the raceway 53 are rigid with each other the downward swinging movement of the arm 57 will swing the magazine 53 backwardly into the dotted line position Fig. 3. This movement occurs after the drill 12 has entered the end eyelet 4 so that as the raceway is swung backwardly the end eyelet will be drawn back from the open end of the raceway.

The pivotal point 56 about which the magazine and raceway turns is so positioned that said magazine and raceway will naturally gravitate into the full line position and hence when the drill-operating lever 26 is raised into the position shown in Fig. 1 after an eyelet has been set the magazine 54 and raceway 53 will automatically gravitate into a position to bring the end eyelet directly underneath the raised drill.

61 indicates a stop adjustably secured to the frame and which limits the gravitating movement of the magazine and raceway and brings them to rest with the end eyelet properly aligned with the drill.

The magazine may be provided with any suitable means for filling the raceway with eyelets. As herein shown the magazine has located within it a rotary brush 63 and the walls of the magazine are formed near the bottom thereof with openings 62 which lead to a passageway 170 that extends around the magazine and communicates with the upper end of the raceway.

The brush 63 is carried by a shaft 64 which extends through the bottom of the magazine and which has at its end a gear 65 meshing with a gear 66 mounted on the shaft 23. The rotation of the shaft 23 thus rotates the brush and provides for filling the raceway with eyelets.

The pinion 66 is splined on the end of the shaft 23 so that it can be moved into and out of engagement with the gear 65. The movement of the pinion into its operative and inoperative positions is governed by a forked rocking member 67 pivoted to the frame and adapted to be actuated by an arm 68. If it is found that the raceway is filling up with eyelets faster than they are being used the pinion 66 can be disconnected from the gear 65 for an interval to allow the accumulated eyelets to be used.

The machine herein disclosed is provided with means for adjusting to a certain extent the amplitude of movement of the drill. This is accomplished by adjusting the pivot of the lever 26. This lever is pivotally mounted on a pin 27 as stated above and said pin is in turn carried by a sleeve 171 that is mounted for turning movement on a stud 172 that is situated non-axially with the pin 27. In other words, the pin 27 is eccentric with reference to the axis of the sleeve 171. Therefore, by turning the sleeve about the stud 172 the pivotal point of the lever 26 may be shifted with reference to the cam thereby varying the position of the drill and also its amplitude of movement.

The machine herein illustrated is also provided with means for disconnecting the clutch 71 automatically after the hole has been drilled and just prior to the setting of the eyelet so that during the setting operation the drill will not be rotating. The advantage resulting from this is that the eyelet will not be injured or marred while it is being set by a rotating drill which extends through the eyelet, as might be the case if the drill were being continually rotated during the eyelet-setting operation.

The means shown for disengaging the clutch 71 is actuated by the downward movement of the spindle, said means being so constructed that when the drill spindle 10 has moved downward sufficiently to carry the drill clear through the stick 3 and to bring the eyelet-setting member 13 nearly into engagement with the eyelet, further downward movement of said drill spindle will cause the disengagement of the clutch.

The clutch 71 comprises the two clutch elements 72 and 73, the clutch element 72 being fast on the constantly-rotating sleeve 70. The clutch element 73 is splined to the shaft 10 through a key 74 operating in a groove 75 formed in the shaft, whereby said clutch element can move longitudinally of the shaft but is fast to the shaft so far as rotative movement is concerned. The clutch member 73 is normally held in engagement with the clutch member 72 by means of a spring 175 which encircles the drill shaft 10 and one end of which engages the collar 29 and the other of which engages the clutch member 73.

The spindle 10 is provided with a clutch-disengaging projection 76 which is located entirely within the groove 75.

During the drilling operation the clutch members 72, 73 are in clutching engagement so that the drill shaft will be driven from the pulley 20 and sleeve 70 through said clutch. As the drill spindle moves downwardly during the drilling of the hole through the stick 3 the projection 76 will move down through the sleeve 70 and when the hole is completely drilled and the eyelet-setting member 13 is about to engage the eyelet the projection 76 will engage the key 74 of the clutch member and disengage said member from the clutch member 72 as shown in Fig. 8 whereby the drill will come to rest.

The spring 175 is so constructed that in all positions of the drill it will bear against the clutch member 73 with sufficient pressure to normally cause said clutch to have a clutching engagement and the clutch member 72 and its engagement is only disrupted when the clutch member 73 is positively moved downwardly by the engagement of the projection 76 therewith as shown in Fig. 8.

The machine herein illustrated also includes a suitable gauge member for properly positioning the curtain so as to ensure that the eyelet will always be placed in the central portion thereof. The bed 8 is shown as being cut away along one edge as indicated at 77 to form a rest or seat for a gauge bar 78. This bar has a general channel shape and it has secured to it two runners or slides 79 and 80 which are movable longitudinally of the bar 8 and which carry positioning fingers 81 and 82 respectively.

While the hole is being drilled and the eyelet is being set in the stick 3 said stick will be held between the two gauge fingers 81, 82 as shown in Fig. 9.

The runners or slides 79, 80 are connected together so that they move in unison but in opposite directions and hence if one slide is adjusted toward and from the center the other side will be correspondingly adjusted and thus in any adjusted position the stick will always be properly centered by the fingers.

The gauge member 78 is in the form of a channel member and in the space between the legs thereof is located two pulleys 83 around which extends a cord or flexible connection 84. One side of this connection is connected to the slide 80 as shown at 85 and the other side of the flexible connection is connected to the slide 79 as shown at 86. Each slide is made of sheet metal and is formed with the depending flanges 87 which embrace the edges of the member 78 and is also formed with the inturned flanges 88 underlying the member 78.

One of the flanges 88 of the slide 80 has a block 85 secured thereto to which both ends of the flexible connection or cord 84 are clamped. One of the underlying flanges of the runner 79 has the block 86 fast thereto which is clamped to the cord 86. With this construction the two slides 79 and 80 are compelled to move in unison but oppositely and the positioning fingers 81 and 82 can thus be readily set to receive a stick of any desired length.

I claim:

1. In a combination drill and eyelet-setting machine, the combination with a drill, of means to give the drill a feeding movement to drill an eyelet hole, of means associated with a drill and operative during such feeding movement to introduce an eyelet into said hole and set said eyelet.

2. In a combined drill and eyelet-setting machine, the combination with a drill, of means to give the drill a forward feeding movement, and means operative forward feeding movement of the drill to introduce an eyelet into the drilled hole and set said eyelet.

3. In a machine of the class described, the combination with a drill spindle, of a drill carried thereby, means to give the drill a feeding movement into and through the work, and means mounted on the drill spindle to introduce an eyelet into the drilled hole, and means cooperating with the last-named means to set the eyelet.

4. In a machine of the class described, the combination with a drill spindle, of a drill mounted thereon, means to support an eyelet in position to be penetrated by the drill during its feeding movement, and means carried on the drill spindle to introduce the eyelet into the drill hole.

5. In a machine of the class described, the combination with a drill spindle, of a drill

carried thereby, means to present an eyelet in the path of the drill as it is fed to the work whereby the drill penetrates the eyelet, an eyelet-setting member carried by the drill and operative during the feeding movement of the latter to introduce the eyelet into the drill hole, and means cooperating with said setting member to set the eyelet.

6. In a machine of the class described, the combination with a drill spindle, of a drill carried thereby, means to rotate the spindle, means to give the drill its feeding movement, means to deliver an eyelet to the drill at each operation thereof, and means to introduce the eyelet into the drill hole and set the eyelet during the feeding movement of the drill.

7. In a machine of the class described, the combination with a drill spindle, of a drill carried thereby, an open-ended raceway for supporting eyelets, means to manipulate the raceway to present the end eyelet therein in position to be penetrated by the drill during the feeding movement thereof and to withdraw the raceway after the end eyelet has been penetrated by the drill thereby to discharge said eyelet from the raceway, and means associated with the drill to introduce the eyelet into the drill hole and set the eyelet.

8. In a machine of the class described, the combination with a drill spindle, of a drill carried thereby, means to rotate the spindle and give the drill a feeding movement, a pivotally-mounted eyelet magazine, an open-ended raceway connected thereto and to which eyelets are supplied therefrom, said raceway normally having a position to place the end eyelet therein in position to be penetrated by the drill during its feeding movement, and means to rock the magazine and thereby retract the raceway after the drill has penetrated the eyelet thereby to discharge the eyelet from the raceway, and means to introduce the eyelet into the drill hole and set said eyelet during the feeding movement of the drill.

9. In a machine of the class described, the combination with a drill spindle, of a drill carried thereby, means to rotate the spindle, means to give the drill a feeding movement, an eyelet magazine, a raceway connected thereto to which eyelets are delivered therefrom, said raceway normally presenting the end eyelet therein in position to be penetrated by the drill during its feeding movement, means actuated by the drill-feeding means to retract the raceway after the eyelet therein has been penetrated by the drill thereby to discharge the eyelet from the raceway, and means associated with the drill to introduce the eyelet to the drilled hole and to set the eyelet.

10. In a combined drill and eyelet-setting machine, the combination with a drill for drilling an eyelet hole, of means including a clutch for operating said drill, means associated with the drill to introduce an eyelet into said hole and set said eyelet, and means for disconnecting the clutch after the hole has been drilled and while the eyelet is being set.

11. In a combined drill and eyelet-setting machine, the combination with a drill for drilling an eyelet hole, of means including a clutch for operating said drill, means associated with the drill to introduce an eyelet into said hole and set said eyelet, and means for automatically disconnecting the clutch after the hole has been drilled and while the eyelet is being set.

12. In a combined drill and eyelet-setting machine, the combination with a drill, of means to give the drill a feeding movement, means, including a clutch, for rotating the drill, means operative during the feeding movement of the drill to introduce an eyelet into the drilled hole and set said eyelet and means actuated by said feeding movement to disengage the clutch while the eyelet is being set.

13. In a machine of the class described, the combination with a drill spindle, of a drill carried thereby, means to give to the drill spindle a feeding movement, means carried by the drill spindle to introduce an eyelet into the drilled hole, means co-operating with said drill to set said eyelet, and means actuated by the feeding movement of the drill spindle to disengage said clutch while the eyelet is being set.

14. In a machine of the class described, the combination with a drill spindle, of means including a clutch for rotating said spindle, a drill carried by said spindle, means to move the drill spindle in the direction of its axis thereby to give the drill a feeding movement, means carried by the drill spindle to introduce an eyelet into the drilled hole and to set the eyelet, and means to disengage the clutch by the axial movement of the drill spindle while the eyelet is being set.

15. In a combined drill and eyelet-setting machine, the combination with a drill, of means to give the drill a feeding movement to drill an eyelet hole through the work, and means associated with the drill to introduce an eyelet into the drill hole and to set said eyelet while the drill still occupies said hole.

16. In a combined drill and eyelet-setting machine, the combination with a drill, of means to give the drill a feeding movement to drill an eyelet hole through the work, and means associated with the drill to introduce an eyelet into the drill hole and to set said eyelet before the drill is withdrawn from the hole.

In testimony whereof, I have signed my name to this specification.

CALVIN N. COLPITTS.

CERTIFICATE OF CORRECTION.

Patent No. 1,859,959. May 24, 1932.

CALVIN N. COLPITTS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 100, claim 1, for "combination" read combined, and line 110, claim 2, after the word "operative" insert the words during the; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of July, A. D. 1932.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)