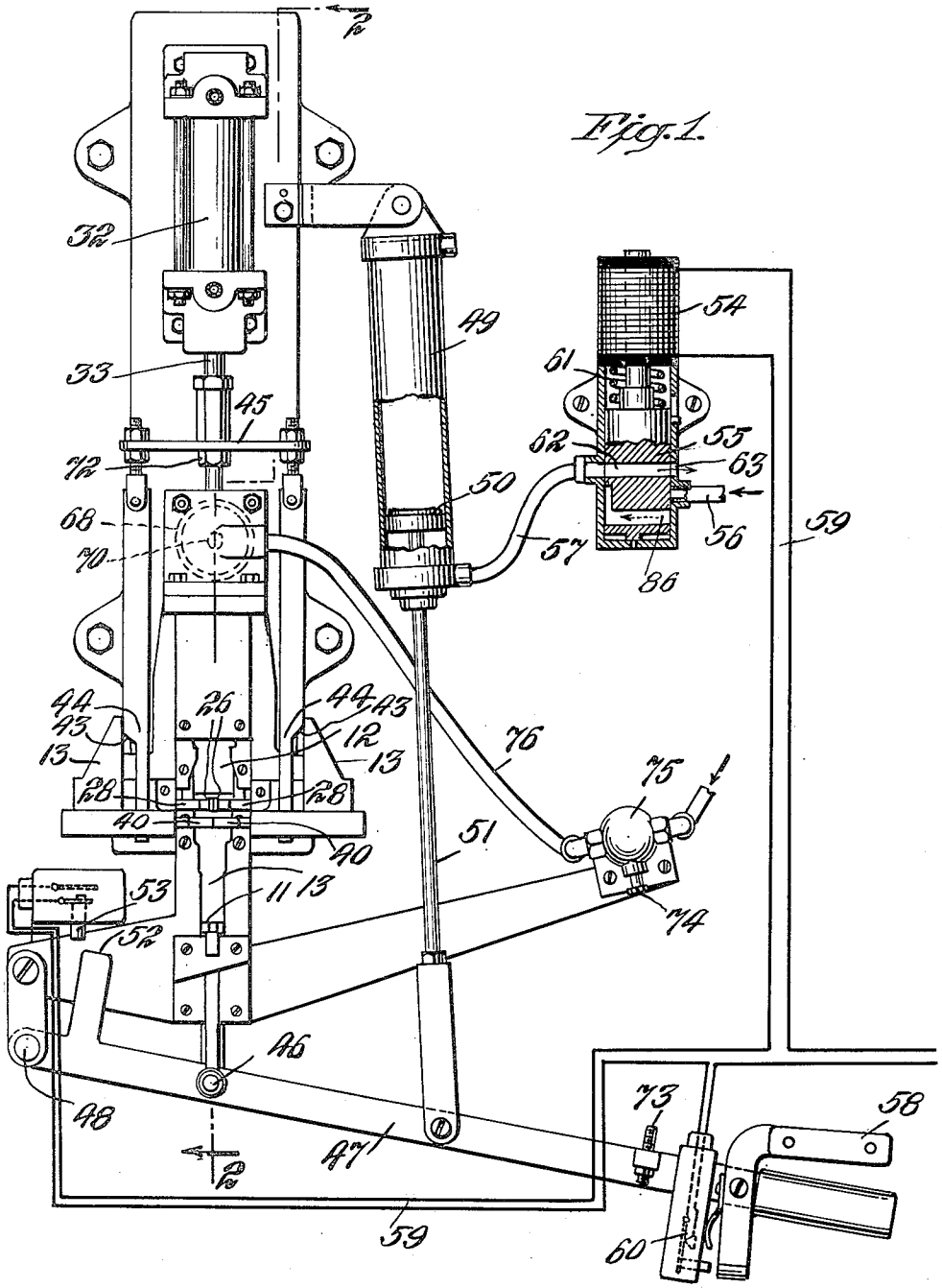
Aug. 17, 1954 S. M. WEISBERG 2,686,357

MACHINE FOR ASSEMBLING CORD TAPS

Filed March 6, 1951 4 Sheets-Sheet 1

Fig. 1.



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Filed March 6, 1951 4 Sheets-Sheet 2

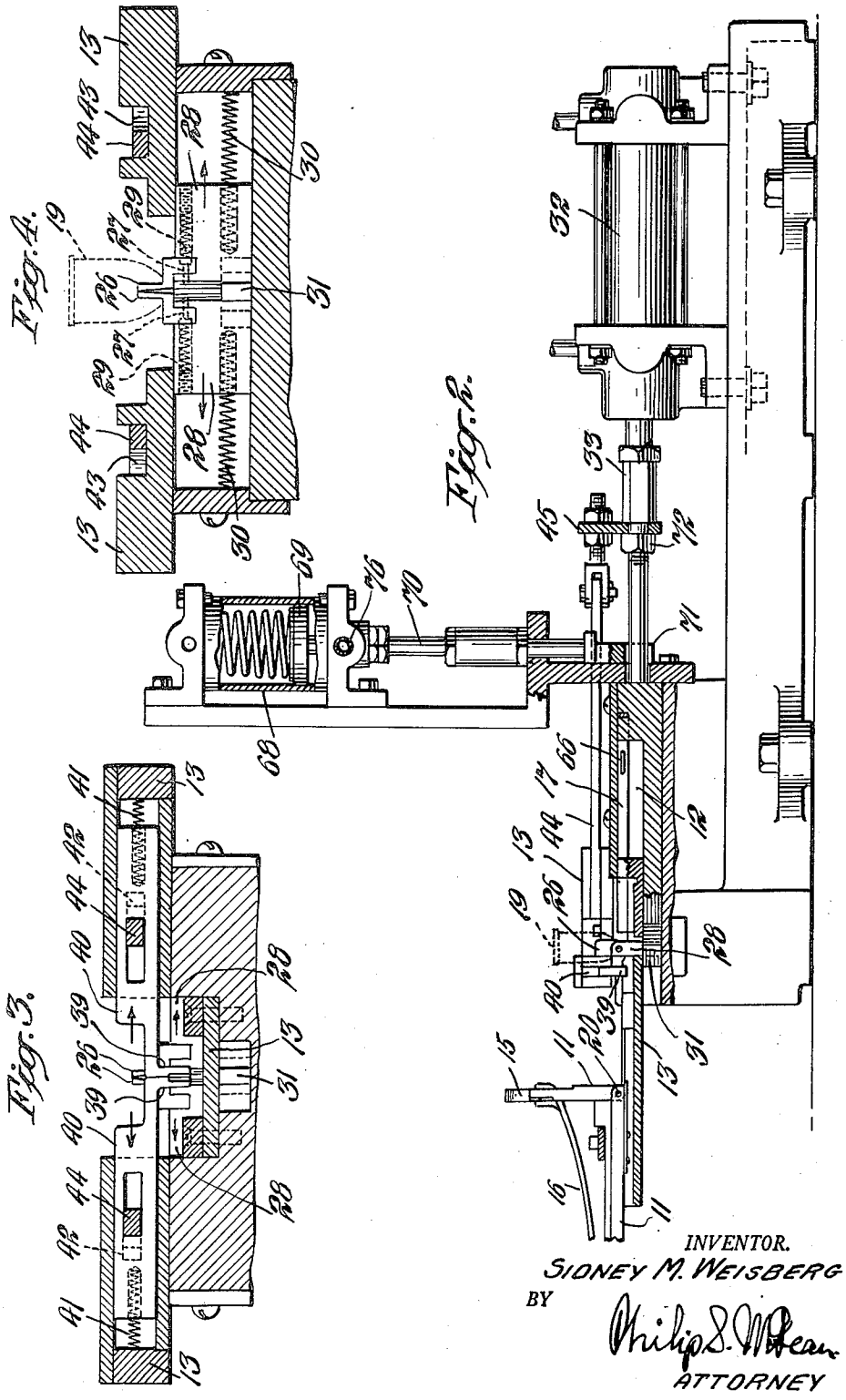

Fig. 2.

Fig. 4.

Fig. 3.

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Filed March 6, 1951 4 Sheets-Sheet 3

Fig. 5.

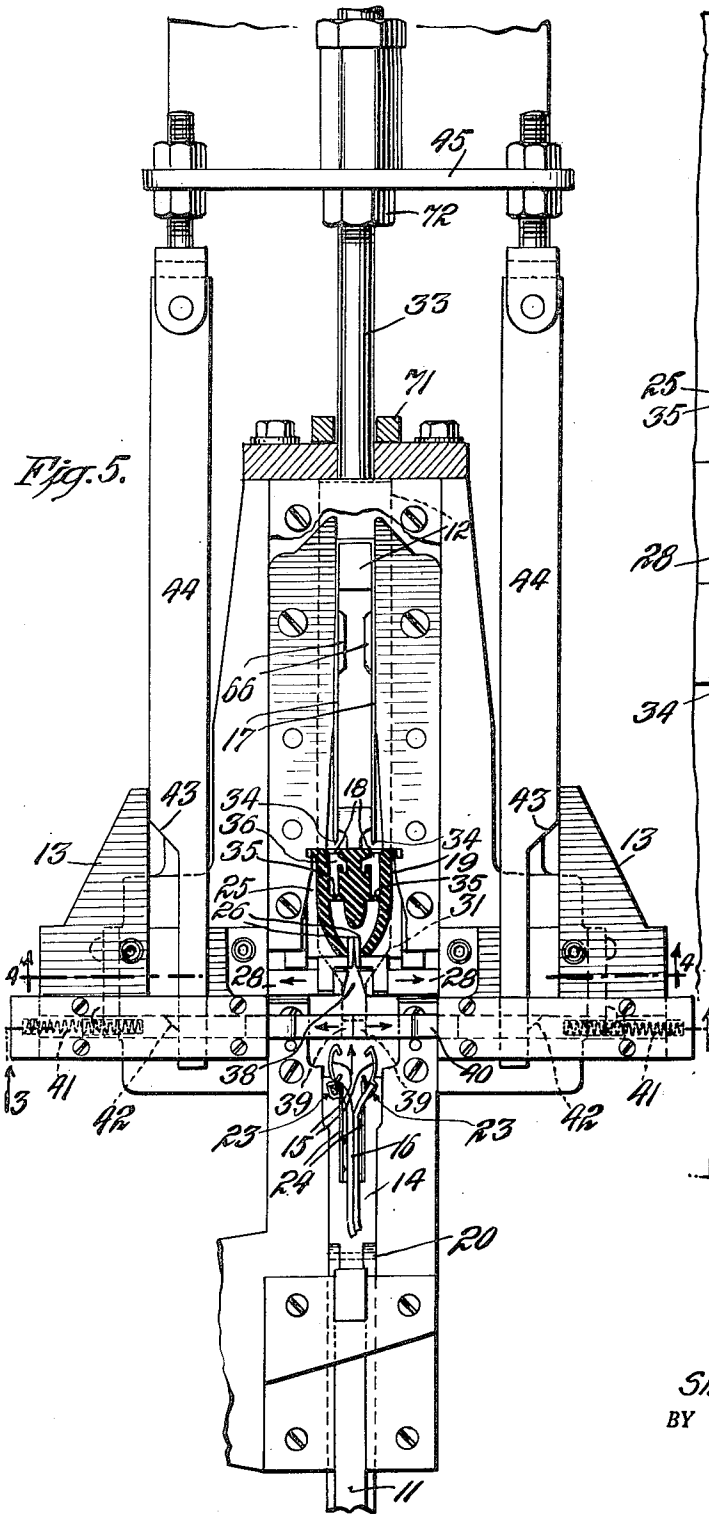
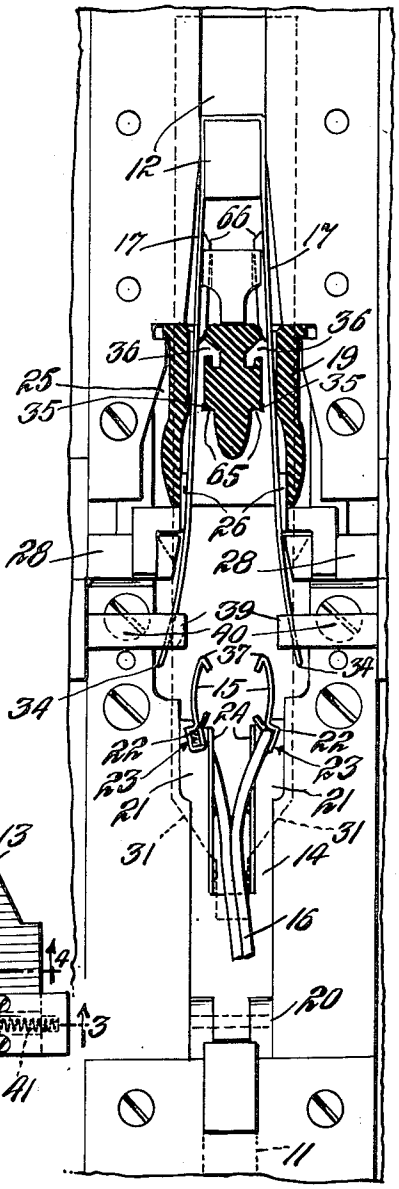


Fig. 6.



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Filed March 6, 1951 4 Sheets-Sheet 4

Fig. 9.

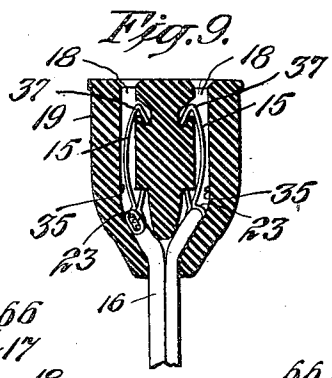


Fig. 7.

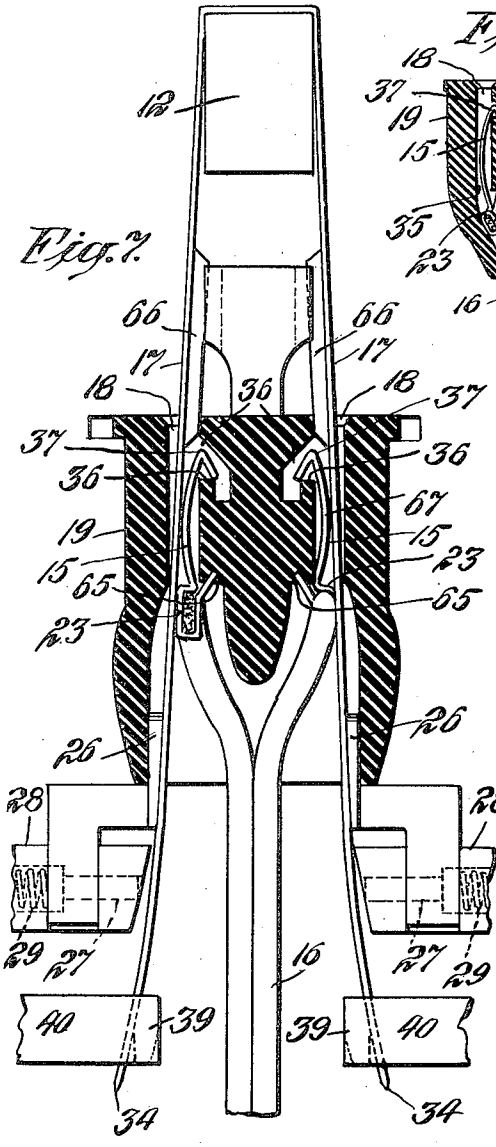
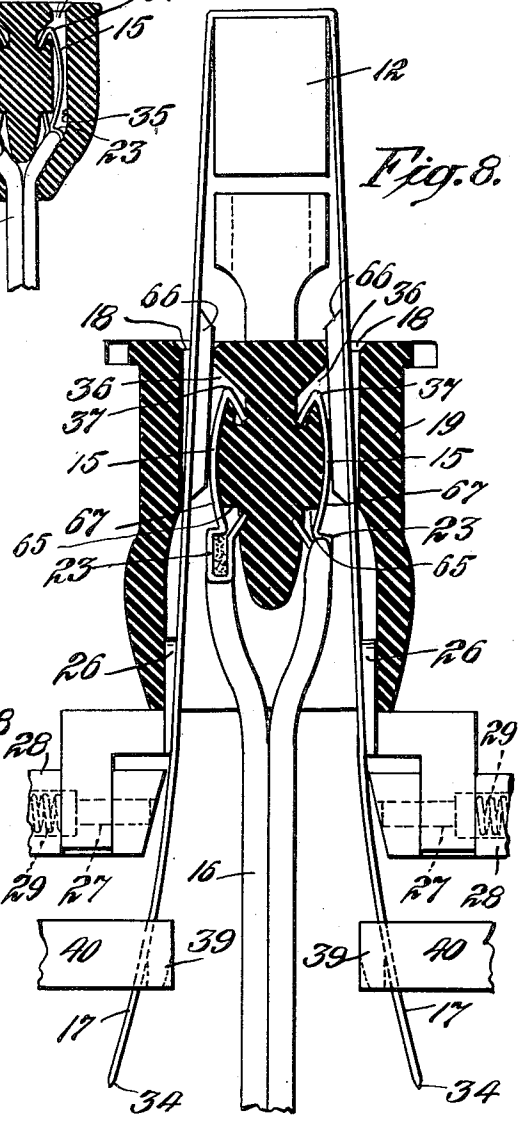


Fig. 8.



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Patented Aug. 17, 1954

2,686,357

UNITED STATES PATENT OFFICE

2,686,357

MACHINE FOR ASSEMBLING CORD TAPS

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Application March 6, 1951, Serial No. 214,077

4 Claims. (Cl. 29—206)

1

The invention here disclosed relates to the assembling of cord taps, particularly those of the type covered in copending patent application Serial No. 195,382, filed November 13, 1950, now abandoned, in which the terminal contacts at the ends of the wires have reversely bent hooked ends to interlock over shoulders provided in the plug body.

A special object of the present invention is to assure firm and positive engagement of these hooked ends of the contacts over the shoulders in the plug.

Other and more general objects of this invention are to provide a machine which will operate to practically automatically effect the proper assembly of the contacts and wires in the plug body.

A further special object of the invention is to provide an automatic machine of the character indicated which will be readily understandable by an operator and which may be governed and controlled with the least physical effort on the part of the operator.

The foregoing and other desirable objects are attained by novel features of construction, combinations and relations of parts, all as hereinafter set forth and as illustrated by way of example in the accompanying drawings.

These drawings, considered as part of the following specification, illustrate a present commercial embodiment of the invention. Structure and arrangement, however, may be modified and changed as regards the present illustration, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a broken part sectional plan view of one of the cord tap assembling machines, some parts shown diagrammatically. In this view the hand lever is lowered or brought back to open the machine, ready for reception of the plug and the contacts to be inserted into the plug;

Fig. 2 is a broken longitudinal sectional view on substantially the plane of line 2—2 of Fig. 1, with the contacts and plug engaged on the holder for the same, ready to be turned down into the assembling position;

Figs. 3 and 4 are enlarged broken transverse sectional views on substantially the planes of lines 3—3 an 4—4 of Fig. 5, showing first the sliding gate or door structure for separating the blades or needles and second, the fingers for supporting and then opening up the plug body;

Fig. 5 is a broken partial plan view showing the tap contacts in the holder, folded down into assembling position and the plug, in section on its

2

holder, also folded down in assembling relation;

Fig. 6 is a further enlarged broken plan of parts appearing in Fig. 5 and showing the top or back slide advanced to effect opening up of the plug, advance of the clearing blades through the opened up plug and separation of the advanced blades by the gate members;

Fig. 7 is a still further enlarged broken sectional detail view showing the contacts advanced into the opened up plug;

Fig. 8 is a similar view showing the final travel of the blades or needles to inset the contacts into fully hooked engagement over the supporting shoulders provided in the plug body;

Fig. 9 is a broken sectional view of the finished cord tap removed from the machine.

The machine shown comprises in the main, front and back slides 11 and 12 operable in opposition in a base or framework 13 and carrying, the first a holder 14 for the terminal contacts and connected wires 15, 16, and the second, blades or needles 17 for clearing the contact receiving passages 18 in the elastic plug body 19.

The holder 14 for the terminal contact is shown as a yoke-shaped piece pivoted on the slide 11, at 20, and having spaced side arms 21 recessed in the ends at 22, Fig. 6, to receive the outer hooked ends 23 of the contacts which are curled about the wires. Flat springs 24 temporarily and yieldingly hold these wire securing ends of the contacts in these seats in the holder.

Fig. 2 shows how the wire terminals may be seated in the forked ends of the pivoted holder 11, and Figs. 5 and 6 show how after engaging the contacts, with wires attached in the holder, the latter may be turned down to locate the contacts in line with the plug 19 seated in the cavity 25 provided to receive the same in the base structure.

Figs. 2 and 4 shows how the plug 19, which is of stretchable material, is first engaged over the distending fingers 26, then in upstanding relation, and Fig. 5 shows how these fingers, pivotally supported at their bases at 27 on the laterally reciprocating slides 28, may then be folded downward to locate the plug in the nest or cavity 25, ready for the opening or expanding operation to receive the contacts.

Springs 29, Fig. 4, seated in the lateral slides 28 in back of the distending fingers, hold the latter in the upright or in the down turned positions shown in Figs. 4 and 5, and springs 30 tend to thrust these slides to the closed, centralized position shown in Fig. 4, with the small end of the wedge 31 entered between the slides.

The plug distending wedge 31, as shown in Fig. 2, is carried by or forms a part of the back or upper slide 12, and the latter is indicated as operated by the air cylinder 32 containing a piston connected with this slide by the rod 33.

Figs. 5 and 6 show how the operation of cylinder 32 is effective through advancement of the rod 33 and slide 12 to force the spaced, generally parallel needles 17, which are spring strips of a size to pass through the blade openings 18 in the plug, inward through these passages, following the distention of the plug by the spreading fingers 26.

The inner ends of the needle strips 17 preferably are sharpened as indicated at 34, Fig. 5, so as to cut through any flash material left at 35 in the blade receiving passages 18 and to clear the openings 36 in the inner sides of these passages which are provided to receive the inner hooked ends 37 of the contacts.

The needle strips 17, as they advance through the plug passages, are deflected by a stationary wedge 38 to opposite sides of companion gate elements 39, Fig. 3, dependent from opposed cross slides 40 which are pressed toward each other by springs 41 and have inclines 42 for engagement by actuating inclines 43 on bars 44 attached to a cross-head 45 on the piston rod 33.

Fig. 6 shows how the needle strips 17 are fully separated by the gate members 39 preparatory to the driving of the wire terminals into the then fully opened plug body.

The front slide 11 is shown in Fig. 1 as pivotally connected at 46 with a hand lever 47 pivotally linked on the frame at 48.

The movement of this lever is assisted by an air cylinder 49, Fig. 1, containing a piston 50 connected with the lever by link 51.

The action of this air cylinder, however, is delayed to give the operator opportunity to first start the slide 11 on its assembling stroke and thus first to make sure that the contact holder is turned down into position and the plug is fully opened, ready to receive the contacts.

This delayed action is automatically effected in the illustration by a lug 52 on lever handle 47, positioned to actuate switch 53, Fig. 1, after the lever has completed a certain initial portion of its stroke, said switch then energizing magnet 54 to actuate and air valve 55 to complete air supply connections at 56, 86, 57, to the power cylinder 49.

The air cylinder 32 which opens the plug may be controlled by a foot valve, not shown, after which hand lever 47 may be started on its movement, the power cylinder 49 then automatically completing the stroke of the lever sufficient to drive the contacts fully into the opened plug, from the Fig. 6 to the Fig. 7 position.

On the completion of this contact inserting movement, started by hand and finished by power cylinder 49, a hand grip 58, Fig. 1, on lever 47 may be actuated to interrupt the magnet circuit 59 at the switch 60, whereupon the spring 61 will lower the movable element 55 of the air valve to the position shown in Fig. 1, to carry the exhaust passage 62 therein in register with an exhaust port 63 in the side of the air valve casing. Pressure in cylinder 49 in front of piston 50 will thereupon exhaust through connection 57, valve passage 62 and port 63, to permit hand lever 47 to be returned to the lowered position to retract the lower or front slide, leaving the contacts 15 hooked over the shoulders provided by the side openings 36 in the plug, substantially as shown in Fig. 7.

In this operation of inserting the contacts in the opened plug, the hooked outer ends 23 of the contacts are engaged over the shoulders 65 in the outer ends of the blade receiving passages 18, substantially as indicated in Fig. 7.

While normally the contacts, with their hooked inner and outer ends, will properly engage over the shoulders at 36 and 65 in the opposite end portions of the blade receiving passages 18, it may happen at times that such engagement and interlocking of the parts may not be fully completed.

The operation illustrated in Figs. 7 and 8 is therefore preferred, in which the needles 17 carry at their inner sides the cam ridges 66 positioned to slide over the outwardly bowed, intermediate portions 67 of the contacts and to force said contacts inwardly toward each other into firmly and fully interlocked engagement over the positioning shoulders 36 and 65.

This extra interlocking movement of the back slide is accomplished in the illustration by providing a vertical cylinder 68, Figs. 1 and 2, containing a piston 69 having a rod 70 carrying a fork 71 arched over the piston rod 33 to normally stand in the way of an abutment 72 on said rod.

This construction provides an automatic stop to limit the stroke of the back slide to a position of the parts as shown in Fig. 7, where the cams 66 on the needles are back of the blade passages in the plug, leaving these passages clear for entry of the contacts 15.

After this partial assembly has been completed the vertical air cylinder 68 is energized to lift the stop yoke 71 and permit the back cylinder 32 to thrust the back slide forward sufficiently to project the cams 66 over the contacts, as shown in Fig. 8.

This is automatically effected by an adjustable stop 73 on the outer end portion of hand lever 47 engaging the stem 74 of an air valve 75 connected to supply compressed air through pipe 76 to the stop lifting cylinder 68.

Hand lever 47 for actuating the front slide therefore has several functions. It is used by hand to start the front slide in its assembling movement. In this initial movement it operates switch 53 to energize power cylinder 49 for completing the assembly stroke, then as this movement is substantially completed it actuates air valve 75 to energize upright cylinder 68 to lift the stop 71 and permit cylinder 32 to complete the stroke of the back slide sufficient to cam the contacts into final position in the plug, and then finally the grip 58 on this handle is operated to interrupt the magnet circuit and permit exhaust of pressure from cylinder 49 and return of the hand lever back to its outer or lowered position, Fig. 1, leaving the contacts locked in place in the plug.

With assembling operations completed as described, the foot valve, not shown, may be tripped to exhaust power cylinders 32 and 68 to retract the back slide and lower the trip, collapsing the plug on the contained contracts and wire and leaving it free to be extracted from its nest 25, as by upward pull on the inserted cord.

In this upward pull on the cord the spreading fingers may be drawn upward into the upstanding position shown in Figs. 2 and 4, ready to receive the next plug or tap body.

The needles, sharpened at their inner ends, are spring tensioned toward each other so that

in entering the contact passages 18, Fig. 5, they will slide over the inner walls of these passages, thus to cut any flash away from these inside walls. This is important since if any flash were left attached to the inner walls, the entering contacts pressing against the same would have a tendency to stretch and carry this flash up over the side pockets 36, which would then have a tendency to obstruct the entrance of the hooks 37 into these pockets.

Also, it is important that the contacts be supported substantially as shown in Figs. 5 and 6, spread apart so that they will not solidly abut the abrupt shoulders 65 and so that instead the more or less rounded and backwardly inclined inner sides of the hooks 37 will operate as cams sliding over and away from the shoulders 65.

In addition to clearing the way for the entering contacts, the needles help to fully open up the tap body and provide guide surfaces over which the contacts may slide freely into fully seated position in the tap. At such time the needle strips are held spread apart by the separators 39 in somewhat convergent relation in the nature of a guide funnel for the contacts, covering the angled inner ends of the tap body spreaders 26.

The importance of power assist for the last part of the operation of the assembling lever 47 will be appreciated by reference to Figs. 7 and 8, which show how the rubber of the tap body must be forcibly stretched to effect engagement of the hooked ends of the contacts over the supporting and positioning shoulders 36 and 65. These hooked ends are spaced closer together than the normal spacing of shoulders 36 and 65.

In the assembling movement the lower hooked ends 23 of the contacts engage the shoulders 65 and must continue their movement before the upper hooked ends 37 will interlock over shoulders 36. Consequently the contacts must be forced in hard enough to compress the rubber at the shoulders 65 sufficient for the inner hooked ends 37 to slip in over the shoulders 36. The power cylinder 49 adds the extra power required for this compressing of the rubber and full seating of the contacts over the shoulders.

When the lever 47 has completed the full assembling stroke, started by hand and finished by power cylinder 50, actuation of the hand grip 58 will effect release of air from under piston 50 and permit the lever to be easily drawn back by hand to the position shown in Fig. 1, the upper end of the power cylinder 49 being open to atmosphere to permit free upward or downward movement of piston 50.

What is claimed is:

1. A machine for assembling cord taps comprising front and back slides mounted to operate longitudinally one over the other, spreader slides mounted to operate transversely of said front and back slides, spreader fingers carried by said spreader slides for entry in the cord passage in one end of an elastic tap body, a wedge carried by the back slide and operable between the spreader slides to effect the opening of the cord passage of an elastic tap body engaged on said spreader fingers, a pair of flexible blades carried by said back slide spaced to enter the blade receiving passage in the opposite end of a tap body distended by said spreader fingers, transversely operating gate members positioned to lie between the inner ends of said blades when the latter are projected through said passages in the tap body, means carried by said back slide for effecting separation of said gate members transversely to thereby spread apart the inner projected ends of said flexible blades, a holder on the front slide provided with means for temporarily supporting a pair of tap contacts and attached wires spaced in position to enter between the spread apart inner ends of said flexible blades, power means operable on the back slide to effect the separation of said spreader slides, the projection of the blades through the tap body passages and the separation of the gate members to effect the spreading of the inner ends of the flexible blades and means for operating the front slide to drive the holder inwardly between the spread apart ends of the blades and carry the contacts thereon in guided engagement over the inner faces of the blades into final position in the tap body.

2. A machine for assembling cord taps comprising front and back slides mounted to operate longitudinally one over the other, spreader slides mounted to operate transversely of said front and back slides, spreader fingers carried by said spreader slides for entry in the cord passage in one end of an elastic tap body, a wedge carried by the back slide and operable between the spreader slides to effect the opening of the cord passage of an elastic tap body engaged on said spreader fingers, a pair of flexible blades carried by said back slide spaced to enter the blade receiving passage in the opposite end of a tap body distended by said spreader fingers, transversely operating gate members positioned to lie between the inner ends of said blades when the latter are projected through said passages in the tap body, means carried by said back slide for effecting separation of said gate members transversely to thereby spread apart the inner projected ends of said flexible blades, a holder on the front slide provided with means for temporarily supporting a pair of tap contacts and attached wires spaced in position to enter between the spread apart inner ends of said flexible blades, power means operable on the back slide to effect the separation of said spreader slides, the projection of the blades through the tap body passages and the separation of the gate members to effect the spreading of the inner ends of the flexible blades, means for operating the front slide to drive the holder inwardly between the spread apart ends of the blades and carry the contacts thereon in guided engagement over the inner faces of the blades into final position in the tap body, cam elements on the inner faces of the blades and means for effecting a final movement of said blades to engage said cam elements with the backs of the contacts inserted in the tap body.

3. A machine for assembling cord taps comprising front and back slides mounted to operate longitudinally one over the other, spreader slides mounted to operate transversely of said front and back slides, spreader fingers carried by said spreader slides for entry in the cord passage in one end of an elastic tap body, a wedge carried by the back slide and operable between the spreader slides to effect the opening of the cord passage of an elastic tap body engaged on said spreader fingers, a pair of flexible blades carried by said back slide spaced to enter the blade receiving passage in the opposite end of a tap body distended by said spreader fingers, transversely operating gate members positioned to lie between the inner ends of said blades when the latter are projected through said passages in the tap body, means carried by said back slide for effecting separation of said gate members transversely to thereby spread apart the inner projected ends of said flexible blades, a holder on the front slide pro-

vided with means for temporarily supporting a pair of tap contacts and attached wires spaced in position to enter between the spread apart inner ends of said flexible blades, power means operable on the back slide to effect the separation of said spreader slides, the projection of the blades through the tap body passages and the separation of the gate members to effect the spreading of the inner ends of the flexible blades, means for operating the front slide to drive the holder inwardly between the spread apart ends of the blades and carry the contacts thereon in guided engagement over the inner faces of the blades into final position in the tap body, cam elements on the inner faces of the blades, means for effecting a final movement of said blades to engage said cam elements with the backs of the contacts inserted in the tap body and including a movable stop limiting movement of the blades through the tap body and means for withdrawing said stop to permit further movement of the blades by said power means to effect engagement of the cam elements with said contacts.

4. A machine for assembling cord taps comprising front and back slides mounted to operate longitudinally one over the other, spreader slides mounted to operate transversely of said front and back slides, spreader fingers carried by said spreader slides for entry in the cord passage in one end of an elastic tap body, a wedge carried by the back slide and operable between the spreader slides to effect the opening of the cord passage of an elastic tap body engaged on said spreader fingers, a pair of flexible blades carried by said back slide spaced to enter the blade receiving passage in the opposite end of a tap body distended by said spreader fingers, transversely operating gate members positioned to lie between the inner ends of said blades when the latter are projected through said passages in the tap body, means carried by said back slide for effecting separation of said gate members transversely to thereby spread apart the inner projected ends of said flexible blades, a holder on the front slide provided with means for temporarily supporting a pair of tap contacts and attached wires spaced in position to enter between the spread apart inner ends of said flexible blades, power means operable on the back slide to effect the separation of said spreader slides, the projection of the blades through the tap body passages and the separation of the gate members to effect the spreading of the inner ends of the flexible blades, means for operating the front slide to drive the holder inwardly between the spread apart ends of the blades and carry the contacts thereon in guided engagement over the inner faces of the blades into final position in the tap body, cam elements on the inner faces of the blades, means for effecting a final movement of said blades to engage said cam elements with the backs of the contacts inserted in the tap body and including a movable stop limiting movement of the blades through the tap body, means for withdrawing said stop to permit further movement of the blades by said power means to effect engagement of the cam elements with said contacts, a hand lever for controlling operation of said front slide and means operable by said hand lever for initiating the operation of said stop withdrawing means.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,086,998	Gilbert	July 13, 1937
2,163,716	Turner	June 27, 1939
2,278,557	Overbeke	Apr. 7, 1942
2,281,478	Chirelstein	Apr. 28, 1942
2,281,479	Chirelstein	Apr. 28, 1942
2,366,908	Jenkins	Jan. 9, 1945
2,476,693	Bogart	July 19, 1949