Oct. 7, 1941. J. T. WRIGHT 2,258,477

STITCHER

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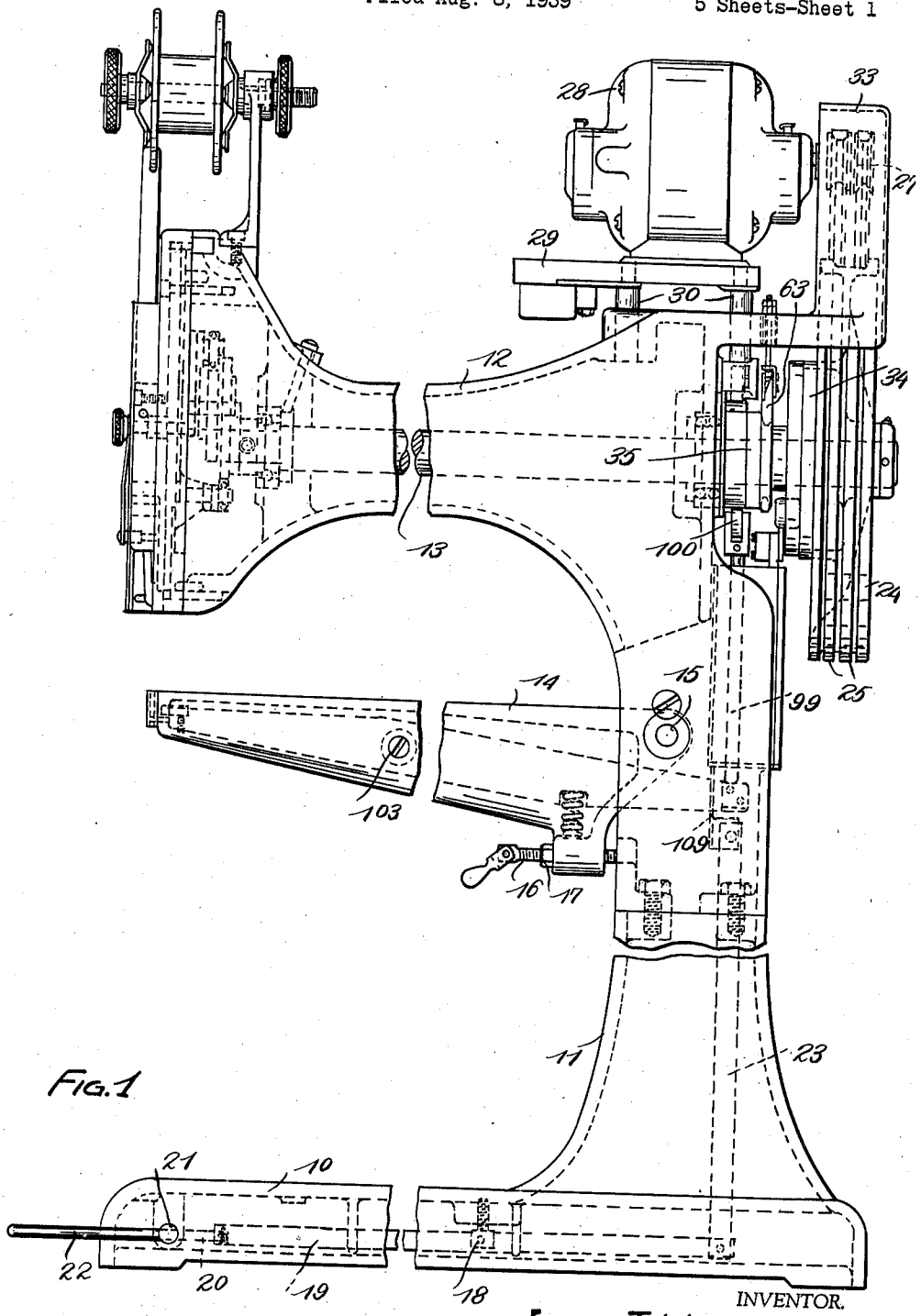


FIG. 1

INVENTOR.

BY JOSEPH T. WRIGHT

Kuis Hudson & Kent

ATTORNEYS

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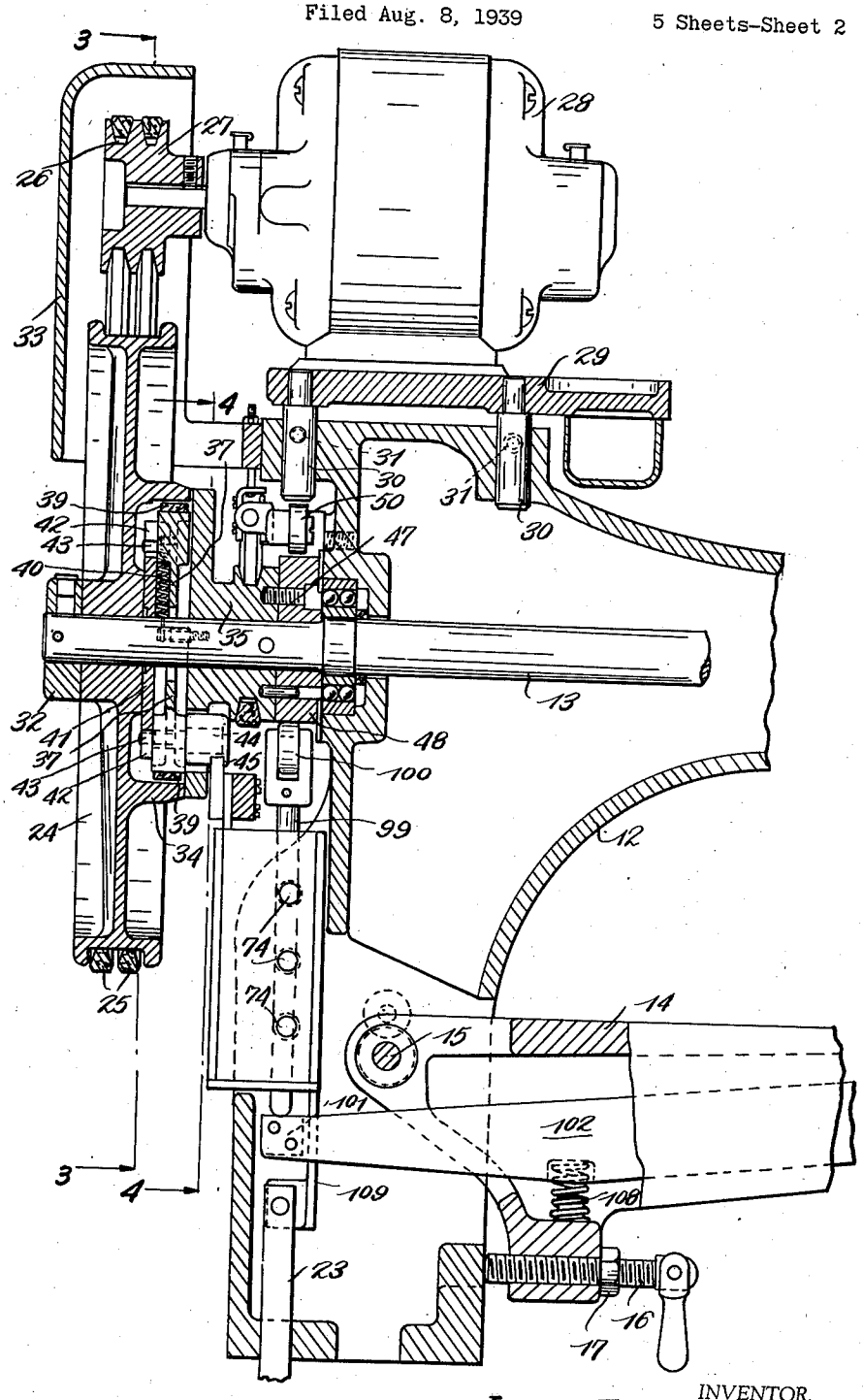


FIG. 2

INVENTOR.
JOSEPH T. WRIGHT
BY
Kwis Hudson & Kent
ATTORNEYS

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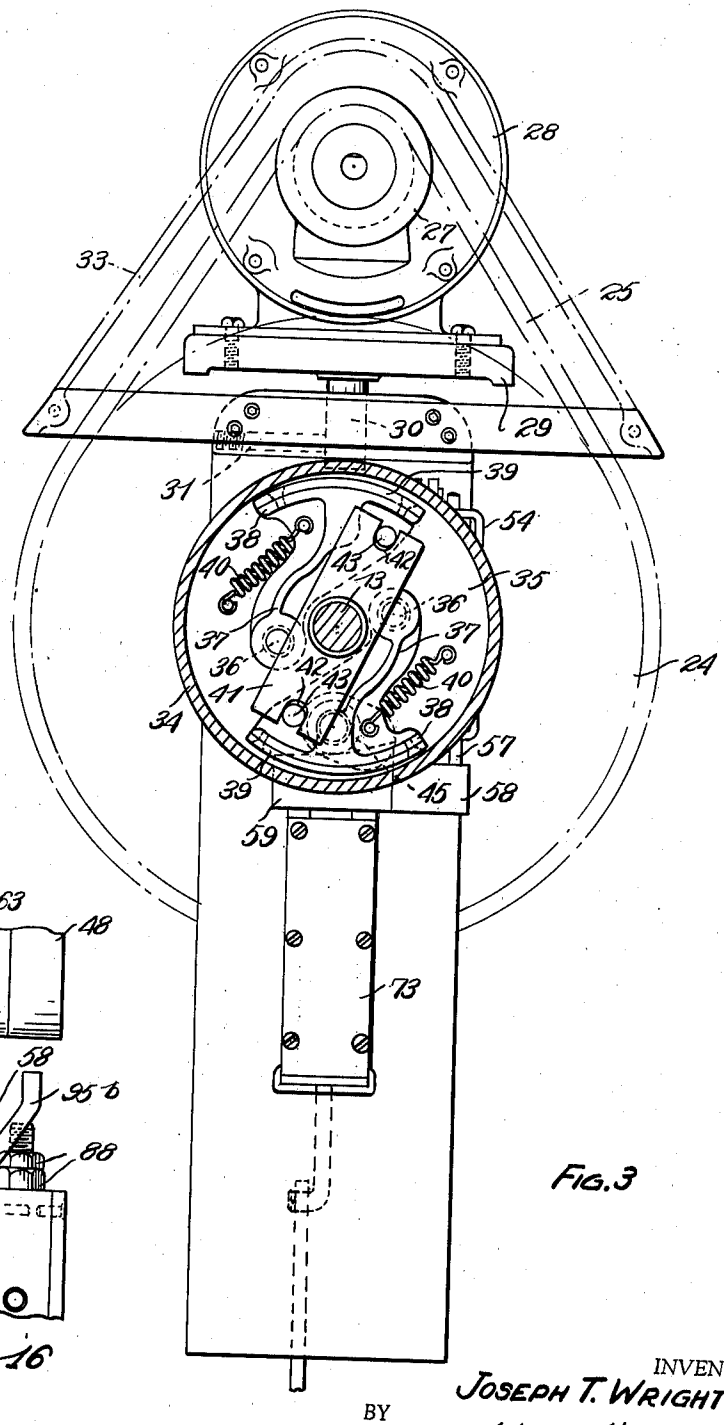


FIG. 3

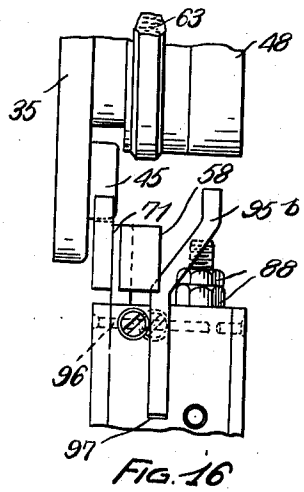


FIG. 16

INVENTOR.
JOSEPH T. WRIGHT

BY Lewis Hudson & Kent
ATTORNEYS

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STITCHER

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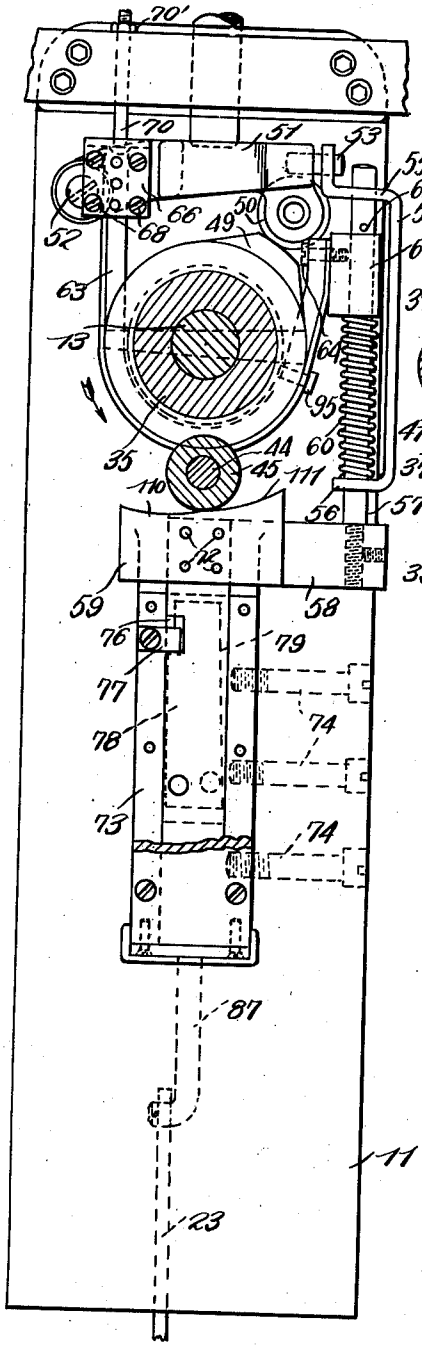


FIG. 4

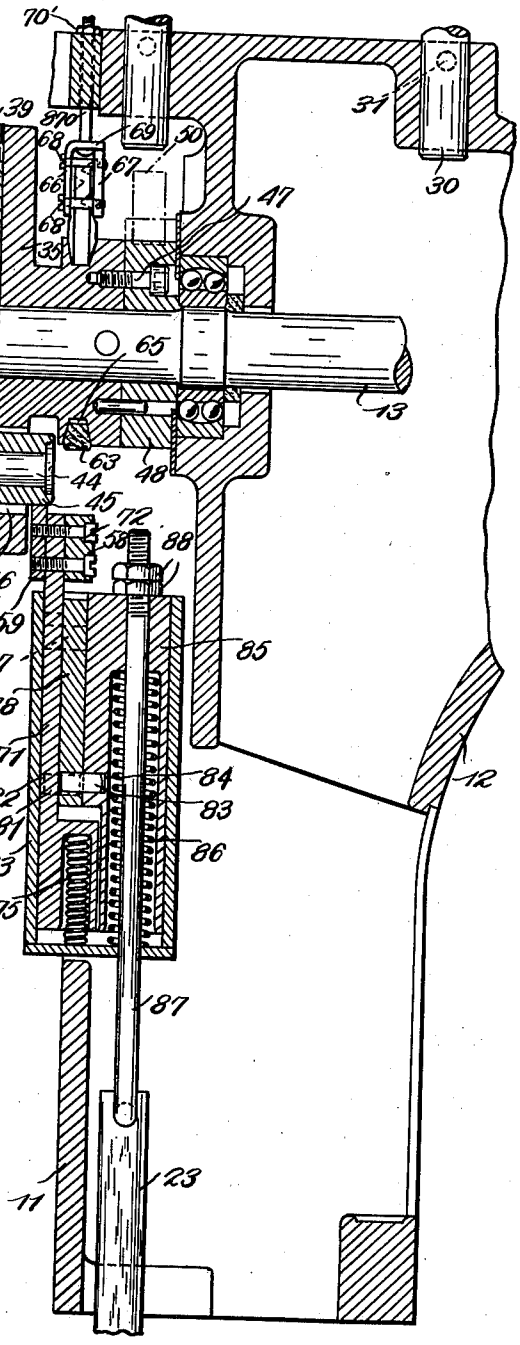


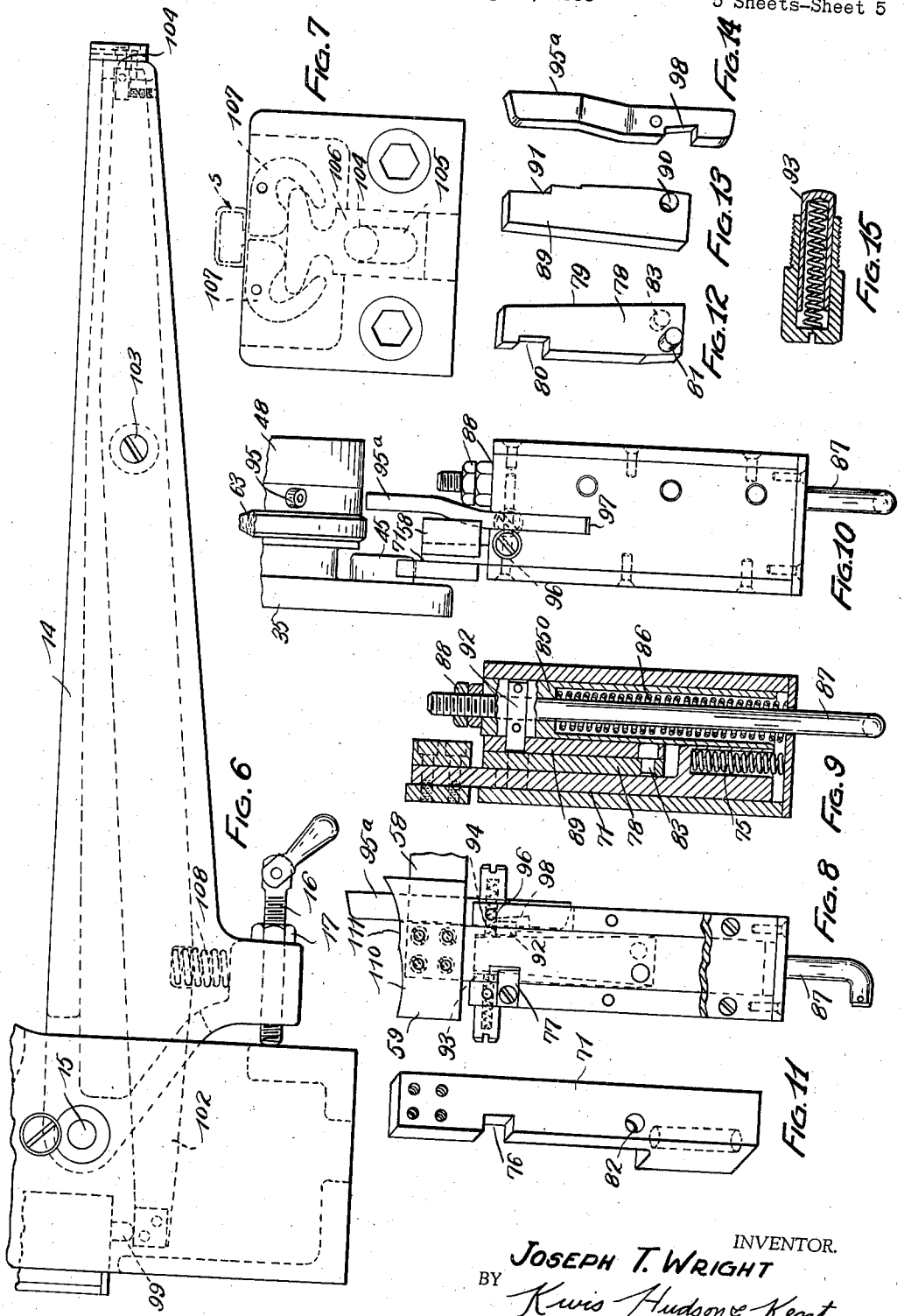
FIG. 5

INVENTOR.
JOSEPH T. WRIGHT
BY Kurio Hudson & Kent
ATTORNEYS

Oct. 7, 1941. J. T. WRIGHT 2,258,477

STITCHER

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INVENTOR.
JOSEPH T. WRIGHT
BY Kuis Hudson & Kent
ATTORNEYS

Patented Oct. 7, 1941 2,258,477

UNITED STATES PATENT OFFICE

2,258,477

STITCHER

Joseph T. Wright, Dayton, Ohio, assignor to Harris-Seybold-Potter Company, Cleveland, Ohio, a corporation of Delaware

Application August 8, 1939, Serial No. 288,968

7 Claims. (Cl. 192—144)

This invention relates to improvements in stitchers, and has reference particularly to the control mechanism for setting the stitching head in motion and stopping it upon the completion of a stitch.

One of the objects of the invention is the provision of a friction clutch having a resilient although substantially positive engagement adapted to be automatically disengaged at the end of a revolution of the driving shaft.

Another object of the invention is the provision of braking means controlled conjointly with the clutch and adapted to be automatically set when the clutch is disengaged and released when the clutch is engaged.

A further object is the provision of a novel trip box which is normally set to provide a rigid backing for a knock-out cam by means of which the clutch is disengaged, together with means adapted to be utilized if desired for preventing a second stitch without further operation of the control mechanism, together with means utilizable if desired either with or without the non-repeat means, for operating a clincher mechanism.

Other objects and features of novelty will appear as I proceed with the description of those embodiments of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Fig. 1 is a side elevation of a stitcher embodying the present invention.

Fig. 2 is a vertical sectional view on a larger scale of a rear portion of the machine illustrating the drive mechanism and the clincher operating mechanism.

Figs. 3 and 4 are elevational views partly in vertical section on the lines 3—3 and 4—4 respectively of Fig. 2.

Fig. 5 is a fragmental vertical section taken on the plane of Fig. 2, showing a modified form with the parts on a still larger scale.

Fig. 6 is an elevational view of a clincher arm which may be employed in connection with the invention.

Fig. 7 is an end view of the clincher arm on a larger scale.

Figs. 8, 9 and 10 are end, sectional and side views respectively of a modified form of trip box embodying the non-repeat means.

Figs. 11, 12, 13 and 14 are detail perspective views of elements of the trip box mechanism.

Fig. 15 is a longitudinal sectional view of a spring plunger shown in Fig. 8.

Fig. 16 is a view similar to Fig. 10 showing a modified non-repeat control.

In Fig. 1 of the drawings I have illustrated a metal stitching machine comprising a base 10 from the rear portion of which a column or standard 11 extends upwardly to a convenient height for supporting a generally horizontal forwardly extending frame member 12 in which is journaled a drive shaft 13 which operates the stitcher head mechanism located in the forward end of that member. The stitcher head is not herein illustrated in detail, but may be of the type illustrated in my copending application Serial No. 283,021, filed July 6, 1939, or other mechanism for the same general purpose adapted to cut a length of wire, form a staple therefrom, and drive and clinch the staple.

A suitable work support is provided beneath the stitcher head. Such support may take different forms, one of which is illustrated herein as consisting primarily of a hollow arm 14 pivotally mounted at 15 in the standard 11 and provided with a screw 16 threadably mounted in the arm and adapted to bear against the face of the column for the purpose of adjusting the height of the forward extremity of the arm. A lock nut 17 serves to hold the screw 16 against accidental movement.

In the base 10 there is mounted a pivot 18 upon which is carried a lever 19 the forward end of which is joined by a pin and slot connection with a crank 20 carried by a cross shaft 21 to the outer ends of which is secured a bail 22 conveniently positioned for operation as a foot pedal. The rear extremity of lever 19 is pivotally connected with a pull link 23 extending upwardly in the hollow standard 11. Depression of the foot pedal exerts a downward pull on the link 23, and it is by virtue of this action that the brake is released and the clutch engaged when the operator desires to form and drive a stitch in the work.

At the rear end of shaft 13 outside of the frame of the machine a fly-wheel 24 is journaled on the shaft and is adapted to be rotated continuously by one or more V-belts 25 that run upon the cylindrical surface of the fly-wheel and in annular grooves 26 in a pulley 27 carried by and secured to the shaft of an electric motor 28. The motor is attached to a plate 29 supported upon shoulders formed in a plurality of posts 30 which extend into bores in the frame 12 and are adapted to be held in different adjusted positions by means of set screws 31. A collar 32 pinned to shaft 13 serves to prevent the fly-

wheel from moving axially in a rearward direction. A guard for the pulley and belts illustrated at 33 is attached by any convenient means to the frame of the machine.

The forward side of fly-wheel 24 carries an annular flange or drum 34 which is machined on its inner side to form a smooth clutch surface. The intermittently driven portion of the clutch mechanism comprises a member 35 pinned to shaft 13 which carries a pair of rearwardly extending studs 36 upon which are pivotally mounted two clutch shoes 37 that have sectors of substantially cylindrical contour to which are secured fabric or other friction facings 39. Tension springs 40 attached to the member 35 and to each of the shoes 37 tend to draw the friction faced sectors outwardly into engagement with the machined surface of drum 34.

In order to make both shoes move in unison both toward and away from engaging position I provide a plate 41 which is journaled on the shaft 13 and has notches 42 in its extremities for the reception of pins 43 which project laterally from the shoes. In the interest of quiet operation I prefer to make plate 41 of hard fiber or other non-metal material.

A stud 44 threaded into one of the shoes 37 and projecting forwardly therefrom carries a roller 45 the function of which is to disengage the clutch, as will be presently explained. In order to permit the roller 45 to swing freely with the movements of its shoe a slot 46 is provided in the member 35.

On the forward surface of member 35 there is mounted by means of screws 47 or the like an annular cam 48, the two elements 35 and 48 together occupying all of the space extending axially between the fly-wheel and the frame of the machine. Cam 48 has a single high spot 49 which normally stands in the position in which it is shown in Fig. 4 where it engages a follower 50 carried at the free end of a rock arm 51 that is pivotally mounted at 52 upon the frame of the machine. The free end of rock arm 51 also carries a pin 53 which projects through an upstanding lip on a bracket 54 which has upper and lower horizontal arms 55 and 56 that are slidably mounted on a post 57 the lower extremity of which is threaded into an extension 58 rigid with a knock-out cam 59 with which the roller 45 cooperates as will be presently explained. Surrounding post 57 above arm 56 there is a coil spring 60 which bears at its upper end against a block 61 that is slidable upon post 57. A pin 62 through the post limits the upward movement of block 61 thereon. One end of a brake belt 63, shown herein as of V-belt form, is fastened to block 61 by a screw 64 or other suitable fastening. The belt then extends downwardly around a V-groove 65 in member 35 and upwardly to a clamp consisting of two plates 66 and 67 with inwardly directed prongs, the plates being drawn together by screws 68. In order to adjust the tension of the belt the plate 66 is provided with an overhang 69 through which extends a bolt 70 that projects through a vertical opening in the frame and receives a nut 70' at its upper end by means of which the adjustment is made.

The knock-out cam 59 above mentioned is mounted on one side of an upwardly projecting part of a slide 71, while the extension 58 is attached to the other side thereof, these three parts being secured together by means of screws 72 or their equivalent. Slide 71 is mounted in a trip box 73 made up of four sides and a bottom connected together by suitable screws or bolts. This box is fixed in the frame of the machine by suitable means such as by three screws 74 extending through bores in the frame and threaded into one of the side wall members of the box. A coil spring 75 tends to raise the slide 71 to its upper and operative position illustrated in Figs. 4 and 5.

In addition to the slide 71 the box contains several other parts which may differ to some extent in order that the box may perform certain special functions amongst which a selection is made according to the use to which the machine is to be put. I will first describe the trip box as constituted for general use, permitting the operator to make either one stitch at a time or to make a series of stitches without interrupting the rotation of the drive shaft, as may be desired. This form is shown in Figs. 4 and 5.

Referring particularly to those figures and to Fig. 11, which is a detail view of slide 71, it will be noted that a notch 76 is formed in one side of the slide to receive a stop 77 that is fastened to a wall of the box and extends inwardly somewhat beyond the slide 71. The movement of the slide is thus limited. Behind the slide there is a latch plate 78 shown in detail in Fig. 12 of the drawings. At its lower end this plate is approximately the same width as slide 71, but one edge is inclined inwardly toward the top as shown at 79, and in the opposite edge near the top of the plate there is a notch 80 of a size to receive the stop 77. Latch plate 78 near its lower end carries a pin 81 which projects into a hole 82 in slide 71. It also carries a second pin 83 which projects in the opposite direction into a hole 84 in another slide 85 which is guided for vertical movement in the box and tends to move in the upward direction because of a coil spring 86. A rod 87 extends through the bottom of the box, through the spring 86 and through a bore in the slide 85 and is threaded at its upper end to receive nuts 88 for adjustment purposes. At its lower end it is bent laterally so as to project through a hole in the link 23 previously mentioned. When the operator depresses the foot pedal the link 23 and rod 87 exert a downward pull upon the slide 85 which, through the pin 83, acts to tilt latch plate 78 about pin 81 as a pivot. The upper end of the latch is thereby swung clockwise, as viewed in Fig. 4, moving the notch 80 out of engagement with the stop 77. The inclined edge 79 of the latch plate permits and limits this swinging movement. Further downward pull on the rod 87 will then move slide 85, latch plate 78 and slide 71 downward together, and the knock-out cam 59 will be withdrawn from operative position permitting springs 40 to effect engagement of the clutch shoes with the clutch drum 34. Simultaneously the post 57 will exert a downward pull through pin 62 upon the block 61 which will relieve the tension on brake belt 63 and leave shaft 13 free to rotate.

If the operator desires to drive one stitch only he takes his foot off the pedal shortly after the high spot 49 of cam 48 moves out from under follower 50. By the latter action the rock arm 51 is permitted to swing downward, lowering the arm 56 of bracket 54 and thereby relieving the compression of spring 60. Now, the operator having released the pedal, springs 86 and 75 again raise the slides 71 and 85 and latch 78 until

the bottom of notch 76 engages stop 77. Then further slight movement of slide 85 operates through the pins to swing latch 78 again to the left causing the notch 80 therein to engage stop 77. The knock-out cam is then in operative position ready to disengage the clutch when a revolution of the shaft 13 has been completed, in other words when the roller 45 again strikes the knock-out cam. The latch 78 by its engagement with the upper surface of stop 77 provides a rigid backing for the load imposed upon the knock-out cam when the roller 45 strikes it. During the major part of the revolution of shaft 13 even after the operator has released the foot pedal there is no braking action exerted because the compression of spring 60 has been relieved by the lowering of the rock arm 51 and the consequent lowering of the bracket arm 56. Simultaneously with the engagement of roller 45 and knock-out cam 59 follower 50 runs up onto high spot 49 of cam 48, whereby bracket 54 is raised, spring 60 is compressed and belt 63 is pulled tightly into engagement with the walls of groove 65, applying a braking action, there being little or no pressure between the top of block 61 and pin 62.

If the operator is desirous of driving a series of stitches without interruption he depresses the foot pedal and holds it depressed, so that knock-out cam 59 remains down and the engagement of the clutch is undisturbed at the end of each revolution. Also the block 61 is held down by pin 62 and the belt 63 is held out of braking engagement regardless of the fact that the bracket 54 is moved upward once for each revolution of the shaft by the operation of the cam upon follower 50.

Now, in the event that it is desired to provide a non-repeat operation, that is one in which the machine is incapable of making more than one stitch for a given depression of the foot pedal, then the slide 85 is removed and a slide 850 together with a secondary latch 89 is substituted therefore. The make-up of the trip box for this purpose and the details of the various parts are illustrated in Figs. 8 to 15 inclusive. In this case the pin 83 on latch plate 78 instead of extending into a hole in slide 850 extends into a hole 90 in secondary latch 89. The latter latch is provided with a relief 91 at its upper end that is normally engaged by a finger 92 that is rigidly mounted in the slide 850. A spring pressed plunger 93 mounted in the box tends to move the upper end of secondary latch 89 to the right, while a similar spring pressed plunger 94 tends to move the upper end of latch 78 to the left. 95*a* is a knock-out lever that is pivoted intermediate its ends upon a pin 96 mounted in one wall of the box, that wall having a slot 97 therethrough to receive the lever. A notch 98 is formed in the lever beneath the pivot point thereof in order to enable the lever to clear the finger 92. The lower end of this lever 95*a* is adapted to engage auxiliary latch 89 and swing it upon pin 83 as a pivot against the action of spring plunger 93.

Now, with this form of trip box the engagement of the clutch and the releasing of the brake are accomplished in the same manner as in the form first described, that is to say when the rod 87 is pulled downwardly, moving the slide 850 downwardly in opposition to the action of spring 86, finger 92 carried by the slide and engaging the relief 91 in auxiliary latch 89 pushes that latch downwardly and operates through hole 90 and pin 83 to swing latch 78 clockwise and disengage it from stop 77. Further pull on the rod 87 is then communicated through pin 81 to slide 71 and the latter is pulled down together with knock-out cam 59 and brake operating post 57. Now, assuming that the operator does not remove his foot from the foot pedal control before a stitch is completed, the machine will nevertheless stop because the screw head 95 which is removably mounted on member 35 will strike lever 95*a* and will cause the lower end of that lever to swing secondary latch plate 89 anti-clockwise, disengaging it from finger 92. The latches 89 and 78 and the slide 71 are then free to rise in response to effort exerted by spring 75, which carries these parts together with the knock-out cam to their upper operative position, whereupon spring plunger 94 will swing plate 78 anti-clockwise into latching position, so that the knock-out cam will then be set again in declutching position. It will now be impossible for the operator to cause the machine to make another stitch until he has first released the foot pedal, because the finger 92 is beneath relief 91 in secondary latch 89 and cannot act to pull that latch down. When the pedal is released however the slide 850 rises and the relief 91 snaps into position under the finger 92. The mechanism is then reset and ready for further operation. Should it then be desired to operate continuously, it is only necessary to remove screw 95 which of course renders lever 95*a* non-operative. Furthermore an alternative construction is used where the non-repeat feature is to be permanent, in which case a lever 95*b* (Fig. 16) is employed. This lever is like 95*a* but is offset to such extent as to bring its top end in line with the path of cam lobe 49 which serves to trip the lever as previously described.

A third function of the trip box has to do with clinching the staple, that is the trip box may be used as a mounting and guide for a clincher operating element, and this feature may be combined either with the repeating or the non-repeating mechanism. The use of the trip box for this purpose involves the provision of a guide for a reciprocating post or rod 99 (Fig. 2) which carries at its upper end a roller follower 100 arranged to run upon cam 48 and cam lobe 49. The lower end of rod 99 projects through the bottom of the trip box and rests upon a block 101 attached to the rear extremity of a lever 102 which is pivoted at 103 in the hollow arm 14. The forward extremity of this lever carries a pin 104 which projects into a slot 105 in a vertically movable driver 106 provided with ears which are adapted to swing a pair of clinchers 107 that are adapted to fold the ends of a staple S (Fig. 7) upwardly and inwardly. A coil spring 108 serves to hold the follower 100 against the cam 48 and to swing the clinchers into inoperative position when permitted so to do by the cam. The single high spot 49 on the cam is so positioned as to accomplish at different times in the cycle the clinching of the staple and the setting of the brake, and also the operation of knock-out lever 95 when the non-repeat mechanism is involved. When the clincher mechanism is employed the rod 99 occupies the position otherwise occupied by the rod 87, and the slide 85 or 850 is arranged to be pulled down by a flat bar 109 suitably attached to the slide and connected at its lower end to link 23. (See Fig. 2.)

The knock-out cam 59 has two separate roller engaging surfaces 110 and 111, the surface 110

being formed about a center which is displaced leftward of the center of shaft 13, Fig. 4, while surface 111 is formed about the axis of shaft 13 as a center. The roller 45 rides up on the surface 110 and comes to rest at the juncture of the two arcuate surfaces, as indicated in Fig. 4, or somewhere on the surface 111. The surface 110 compensates for wear of the friction facings 39, that is the greater the wear the earlier will be the initial engagement of the roller with the surface 110. If the roller 45 should move somewhat beyond the juncture between surfaces 110 and 111, that is to a point somewhere along the surface 111, before the brake completely stops the rotation of the shaft, the extent to which the clutch shoes are withdrawn will remain always sufficient for disengagement of the clutch shoes.

When the roller 45 rides up onto the knock-out cam and the corresponding shoe is retracted by being swung around its pivotal mounting 36 in opposition to the action of its spring 40, identically the same movement will be transmitted to the other shoe by virtue of the plate 41 and its pin and slot connection with the two shoes. Similarly when the knock-out cam is withdrawn by the operator's pressure on foot pedal 22 the plate 41 allows an equalized grip of the shoes upon the clutch surface of drum 34. While the action of the clutch is comparatively soft and quiet due to the resilient qualities of the friction facings, it is possible to use non-resilient facings because the driving force is due to the self-energizing action of the mechanism. That is to say, the angular relationship of the drive shaft, the pivot centers of the shoes and the contact position of the facings upon the drum causes a "servo" or self-energizing action, independent of the nature of the facings. However the resilient facings which I prefer to use because of their higher coefficient of friction allow an angular relation that is preferable from the standpoint of induced stresses in the parts.

Having thus described my invention, I claim:

1. In mechanism of the class described, a clutch, a knock-out cam for disengaging said clutch at a predetermined point in its revolution, a plate on which said knock-out cam is mounted, a latch adapted to hold said plate against movement when the knock-out cam is in operative position, and manual control means for moving said latch to inoperative position and retracting said plate, whereby said knock-out cam is temporarily disabled.

2. In mechanism of the class described, a clutch, a knock-out cam for disengaging said clutch at a predetermined point in its revolution, a plate on which said knock-out cam is mounted, a latch adapted to hold said plate against movement with the knock-out cam in operative position, manual control means for moving said latch to inoperative position and retracting said plate, whereby said knock-out cam is moved to inoperative position, and means for automatically returning said plate and said latch to operative position when said manual control means is released.

3. In mechanism of the class described, a clutch, a knock-out cam for disengaging said clutch at a predetermined point in its revolution, a longitudinally movable plate on which said knock-out cam is mounted, a rigid guide for said plate, a latch pivotally connected with said plate adapted to hold said plate against movement in its guide with the knock-out cam in operative position, manually controlled means for swinging said latch about its pivot to inoperative position and thereafter sliding said plate with the knock-out cam to inoperative position, and means for returning the parts to operative position when said manual control means is released, whereby rigid support is provided for the knock-out cam in the operative position thereof.

4. In a machine of the class described, a motor, a shaft, means for connecting the motor and shaft comprising a clutch, means tending to knock out said clutch at a given point in each revolution of the shaft, manual control means for withdrawing said knock-out means to permit the clutch members to engage each other and the shaft to make a revolution, and means for automatically returning the knock-out means to operative position in the event that the operator should fail to release said knock-out control means before the shaft has completed a predetermined portion of its revolution.

5. In a machine of the class described, a motor, a shaft, means for connecting the motor and shaft comprising a clutch, means tending to knock out said clutch at a given point in each revolution of the shaft, manual control means for withdrawing said knock-out means to permit the clutch members to engage each other and the shaft to make a revolution, and means for automatically returning the knock-out means to operative position in the event that the operator should fail to release said knock-out control means before the shaft has completed a predetermined portion of its revolution, the release of said manual control means being necessary before a further operation to withdraw said knock-out means is possible.

6. In a machine of the class described, a motor, a shaft, means for connecting the motor and shaft comprising a clutch, a brake, cam means turning with the shaft for causing said brake to exert braking action on said shaft at a given point in the revolution thereof, means tending to knock out said clutch at the same given point in each revolution of the shaft, means under control of the operator for withdrawing the brake from operable position and withdrawing said knock-out whereby the clutch is engaged and a revolution of the shaft is begun, and means actuated by said cam means for automatically returning the knock-out to operative position in the event that the operator should fail to release said knock-out control means before the shaft has completed a predetermined portion of its revolution.

7. In a machine of the class described, a motor, a shaft, means for connecting the motor and shaft comprising a clutch, a brake, cam means turning with the shaft for causing said brake to exert braking action on said shaft at a given point in the revolution thereof, means tending to knock out said clutch at the same given point in each revolution of the shaft, means under control of the operator for withdrawing the brake from operable position and withdrawing said knock-out whereby the clutch is engaged and a revolution of the shaft is begun, and means actuated by said cam means for automatically returning the brake to operable position and the knock-out to operative position in the event that the operator should fail to release said control means before the shaft has completed a predetermined portion of its revolution.

JOSEPH T. WRIGHT.