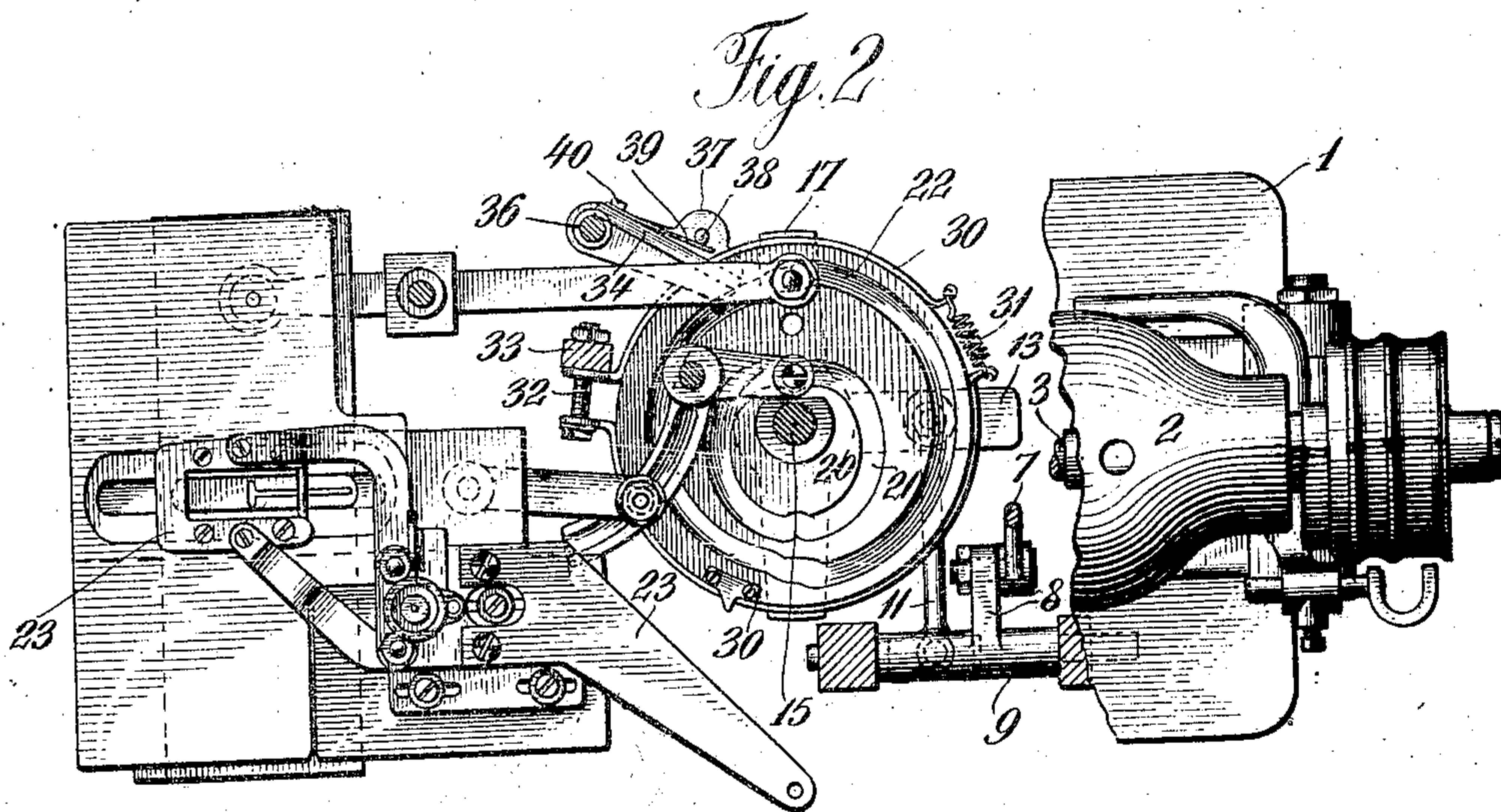


PATENTED AUG. 6, 1907.

APPLICATION FILED SEPT. 30, 1905.

2 SHEETS—SHEET 1.



WITNESSES:
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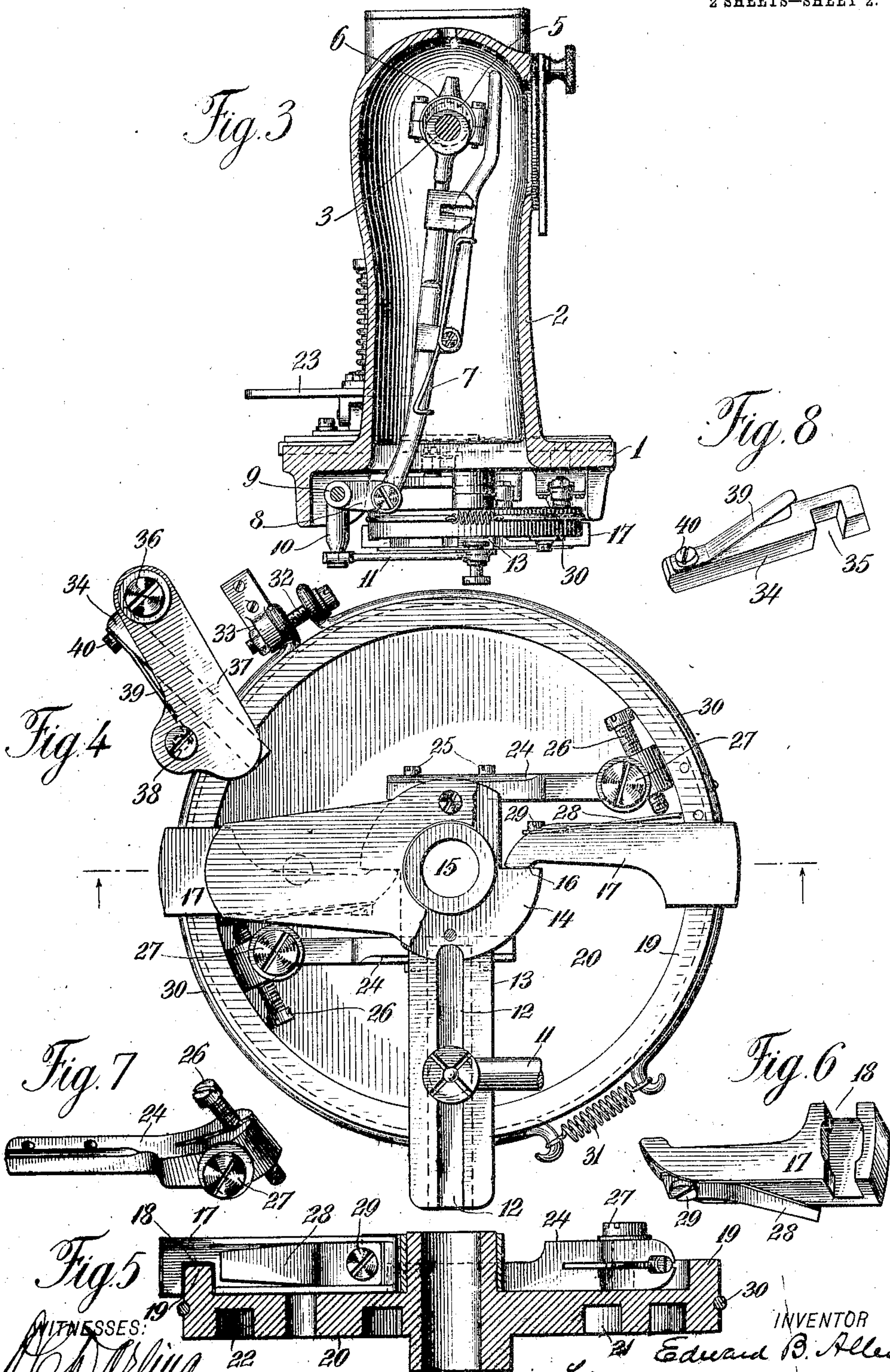
No. 862,125.

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E. B. ALLEN.
FEEDING MECHANISM FOR BUTTONHOLE SEWING MACHINES.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

EDWARD B. ALLEN, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

FEEDING MECHANISM FOR BUTTONHOLE-SEWING MACHINES.

No. 862,125.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed September 30, 1905. Serial No. 280,769.

To all whom it may concern:

Be it known that I, EDWARD B. ALLEN, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Feeding Mechanism for Buttonhole-Sewing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object to insure the certainty and uniformity of action of the feeding mechanism of buttonhole sewing machines.

Of the mechanisms of this class heretofore embodied in buttonhole machines in commercial use, those involving a friction clutch, while being capable of the most exact adjustments for moderate speeds and of operation without shock in communicating the usual relative step-by-step movements of the stitch-forming mechanism and the work, had the disadvantage of becoming variable in extent at different speeds of the machine; and mechanism involving ratchet-and-pawl devices not only lacked the capability of exact adjustment referred to, but involved for each impulse a retrogression of the point of the pawl slightly beyond the tooth next to be engaged, and in the succeeding forward or operative movement effected its engagement with sufficient shock or jar to be noisy and thus affect the durability of the machine.

By the present invention, in the use of a cramping clutch comprising an annular clutch-ring and gripping-dogs therefor capable of engaging the same at any point, I am enabled to secure all the advantages to be derived from a friction clutch, while the provision for positively moving such clutch-dogs both forwardly to communicate a feeding movement and backwardly for recovery preparatory to a succeeding feeding movement, enables me to provide practically a positive clutch having all of the desirable characteristics of a friction clutch without the practical defects of the latter.

In order to prevent the overthrow of the feed-wheel under a feeding impulse of the clutch-dogs when moving at high speed, I provide the usual friction band encircling and yieldingly embracing the periphery of the feed-wheel and connected with the frame or bed of the machine, while the retrograde movement of the feed-wheel with the retraction of the feed-dogs is positively prevented by means of a stationary cramping dog embracing the flange of the feed-wheel and held from movement therewith by engagement with a fixed abutment upon the machine frame.

In the accompanying drawings, representing a machine similar in general constructive features to that forming the subject of my pending application Serial No. 250,507, filed March 17, 1905, Figure 1 is an elevation of the machine with a portion of the bracket-arm

and the bed-plate removed to expose certain of the operative parts, and Fig. 2 a plan of the same with the forward portion of the bracket-arm and the bed-plate removed. Fig. 3 is a transverse section through the standard portion of the bracket-arm. Fig. 4 is a plan upon an enlarged scale of the feed-wheel and means for actuating and otherwise controlling the same, and Fig. 5 a transverse section of the same. Fig. 6 is a perspective view of one of the feed-dogs and Fig. 7 a similar view of one of the feed-dog retracting arms. Fig. 8 is a perspective view of the feed-wheel holding clutch-dog.

The machine is constructed with the usual bed-plate 1 and bracket-arm 2 in which is journaled the main shaft 3 provided with the shuttle-actuating crank 4 and feed-actuating crank 5, the latter being embraced by the strap 6 of the two-part connecting rod 7 having its lower end connected with a lateral arm 8 of a rock-shaft 9 having a depending arm 10 to which is connected by a suitable ball-joint one end of a pitman 11 whose other end carries the usual block fitted adjustably within a slot 12 in the clutch-actuating lever 13 whose hub 14 pivoted upon the feed-wheel shaft 15 is provided with diametrically opposite notches affording the shoulders 16 engaging the inner ends of the clutch-dogs 17 whose outer ends are provided with transverse slots 18 embracing the peripheral flange 19 of the feed-wheel 20. The component members of the two-part connecting rod 7, as represented herein, are constructed substantially in accordance with my U. S. Patent No. 738591, dated September 8, 1903, but this feature forms no part of the present invention.

The upper face of the feed-cam 20 is provided with an inner work-feeding cam-groove 21 and outer work-shifting cam-groove 22, each being entered by a stud carried by a member of the mechanism for communicating to the work-clamp 23 the longitudinal feeding and lateral shifting movements, which mechanism is or may be constructed and arranged as shown and described in my said Patent No. 738591. The hub 14 of the actuating lever is provided with diametrically opposite seats to which are secured in tangential relation by means of the screws 25 the inner ends of the feed-dog retracting arms 24 provided at their outer ends with split screw-threaded bosses carrying the contact screws 26 whose points are directed toward the outer operative ends of the clutch-dogs 17 adjacent the flange 19 of the feed-wheel 20, which are secured from rotation by means of the clamp-screws 27. The edge of each of the clutch-dogs 17 adjacent the retracting arm 24 is slightly channeled to receive a flat buffer spring 28 whose free end is disposed adjacent the point of the contact screw 26 while its opposite end is secured to the clutch-dog by means of a fastening screw 29.

To prevent the overthrow of the feed-wheel 20 under

the action of the dogs 17, such wheel is provided with a peripheral groove in which is disposed the usual friction band 30 comprising two substantially semicircular parts connected at one end by a spring 31 and at the other end by a bolt 32 securing the same also to a lug 33 attached to the bottom of the bed-plate to prevent the movement of such friction band with the feed-wheel.

The detaining clutch-dog 34 is provided with an enlarged operative end portion provided with a notch 35 to embrace the flange 19 of the feed-wheel 20, its free outer end resting in contact with a stud 36 depending from the bed-plate and carrying a guard plate 37 provided with a stud screw 38 serving as an abutment for the free end of a flat spring 39 whose opposite end is fastened by means of a screw 40 to the outer end of the clutch-dog 34, by means of which spring the clutch-dog is maintained continuously in cramping relation with the feed-wheel flange 19, the clutch-dog 34 being prevented from movement under the retrograde tendency of the feed-wheel by its contact with the stud 36.

In the operation of the device, the actuating lever 13 is given its usual vibrating movements by means of the described connections with the crank 5 upon the main shaft, the amplitude of such movements being controlled by the relation of the link 11 with such member, and the operative engagement of the shoulders 16 of the hub 14 with the inner ends of the clutch-dogs 17 produces a cramping action of the latter upon the feed-wheel flange 19 in a manner well-known.

Heretofore, in machines of this class, retracting springs have been employed to return the clutch-dogs to initial position after each action upon the feed-wheel, but such expedient was at times objectionable because they failed to perform their normal function when the grip of the dogs upon the flange 19 was prevented by any means, as the introduction of dirt in the operative parts. In the continued use also of the mechanism embodying such expedient, the wear upon the cramping jaws of the clutch-dogs caused them to gradually recede from the retracting springs whose effect was thus continually decreased, whereby their effectiveness in performing their operation was correspondingly impaired. By the present improvement, the employment of the contact screws 26 carried by the rigid arms 24 connected with the actuating lever 13 insures the positive retraction of the clutch-dogs 17, while the interposition between such parts of the buffer springs 28 provides a yielding connection between them serving to readily take up any slight wear of the parts while maintaining the operative cramping relation between the clutch-dogs and feed-wheel flange. The application of the buffer springs 28 to their respective clutch-dogs is particularly advantageous in that they constantly maintain their relation with the clutch-dogs regardless of the wear of the parts, which is provided for in the present improvement by the screws 26 adapted to be advanced from time to time to maintain the effective operation of the mechanism.

It is evident that, by a sufficiently close adjustment of the points of the contact screws 26 to the operative ends of the clutches 17 the buffer springs might be dispensed with, the relative play of the parts involved being inappreciable when the adjustment is properly made for such operation; and it will also be seen that, although very desirable, the adjustability of the op-

erative ends of the retracting arms 24 is not necessary to the practical working of the device, and that such feature, even when employed, may be secured by other means which will readily suggest themselves without the use of the specific expedient herein described. As represented in Fig. 6, the jaws of the clutch-dogs formed by the notches 18 are preferably recessed or cut away intermediate their ends to afford short operative faces so as to enable them to perform their cramping action more effectively, especially after they become somewhat worn by long use.

While the feeding mechanism is herein represented as involving a rotary feeding member 20 actuated by means of feed-dogs reciprocating in a circular path, it is obvious that the particular character of the feeding member and direction of reciprocation of its actuating feed-dogs are not material elements of the present improvement. It will therefore be understood that, while the improvement is herein disclosed in its preferred form, it is not to be understood as limited to the specific features of construction and arrangement of parts herein disclosed, but the same may be considerably varied without departing from the spirit of the invention.

Having thus set forth the nature of the invention, what I claim herein is,—

1. In a sewing machine, the combination with stitch-forming mechanism and a relatively movable work holder, of a feed-wheel for producing the relative movements between the work-holder and the stitch-forming mechanism, a reciprocating feed-actuating lever, a clutch-dog engaging said feed-wheel and deriving its operative movements from said actuating lever, a follower rigidly connected with said actuating lever and provided with an operative portion extended into the path of movement of said clutch-dog and adjustable toward and from the same for insuring the return of the latter to initial position after each of its operative movements, and means interposed between said follower and clutch-dog for yieldingly maintaining the latter constantly in contact relation with said actuating lever.

2. In a sewing machine, the combination with stitch-forming mechanism and a relatively-movable work-holder, of a feed-wheel for producing the relative movements between the work-holder and the stitch-forming mechanism, a reciprocating feed-actuating lever, a clutch-dog engaging said feed-wheel and deriving its operative movements from said actuating lever, a spring buffer carried by said clutch dog and disposed upon the side thereof which is in advance during its forward or operative movements, and a follower rigidly connected with said actuating lever and provided with an adjustable abutment disposed in line with said clutch-dog and the spring buffer carried thereby and adapted to engage the latter.

3. In a sewing machine, the combination with stitch-forming mechanism and a relatively-movable work-holder, of a feed-wheel for producing the relative movements between the work-holder and the stitch-forming mechanism, a reciprocating feed-actuating lever, a clutch-dog engaging said feed-wheel and deriving its operative movements from said actuating lever, an arm rigidly connected at one end with said actuating lever, and provided at the other end with an adjacent stop-screw disposed in the path of movement of said clutch-dog with its point presented to the latter, and a flat buffer spring applied to said clutch-dog in the path of movement of said stop-screw and adapted to be engaged thereby.

4. In a sewing machine, the combination with stitch-forming mechanism and a relatively-movable work-holder, of a feed-wheel for producing the relative movements between the work-holder and the stitch-forming mechanism, a reciprocating feed-actuating lever, a clutch-dog engaging said feed-wheel and deriving its operative movements from said actuating lever, an arm rigidly connected

at one end with said actuating lever and provided at the other end with a split screw socket, an adjusting screw fitted to said screw socket substantially in the path of movement of said clutch-dog with its point presented to the latter, and a fastening screw for clamping said socket upon the adjusting screw.

5 5. In a sewing machine, the combination with stitch-forming mechanism and a relatively-movable work-holder, of a feed-wheel provided with an annular clutch-engaging portion and adapted for producing the relative movements between the work-holder and the stitch-forming mechanism, means including a reciprocating clutch-member for imparting step-by-step rotary movements to said

feed-cam, a sectional friction band embracing said feed-cam, and comprising a tension spring with means for adjusting the tension of the same, and an independent spring-pressed holding-dog adapted to engage the clutch-engaging portion of said feed-wheel for preventing retrograde movement of the latter. 15

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses. 20

EDWARD B. ALLEN.

Witnesses:

HENRY J. MILLER,

HENRY A. KORNEMANN.