

No. 820,964.

PATENTED MAY 22, 1906.

A. B. FOWLER.

SHUTTLE ACTUATING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED JAN. 13, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

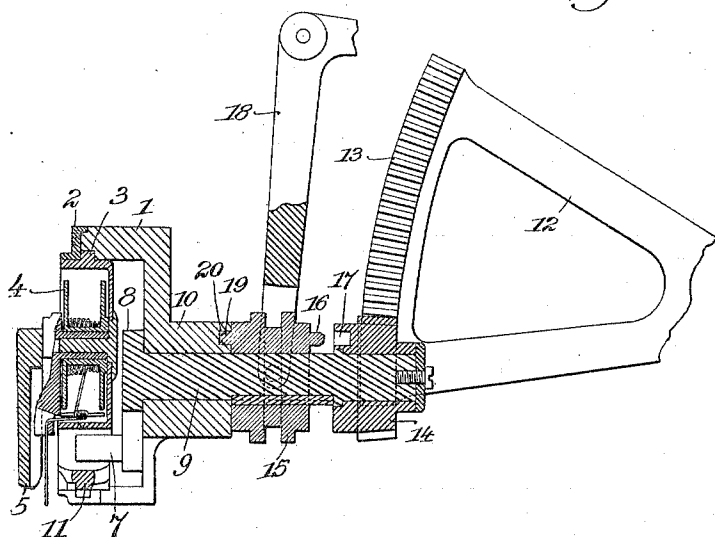
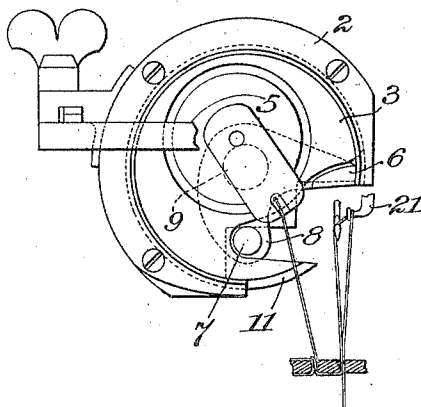


Fig. 2.



Witnesses:
John F. C. Prinkert
Fred O. Fish

Inwitness:
A. B. Fowler
by his Attorney
Benjamin Phillips

No. 820,964.

PATENTED MAY 22, 1906.

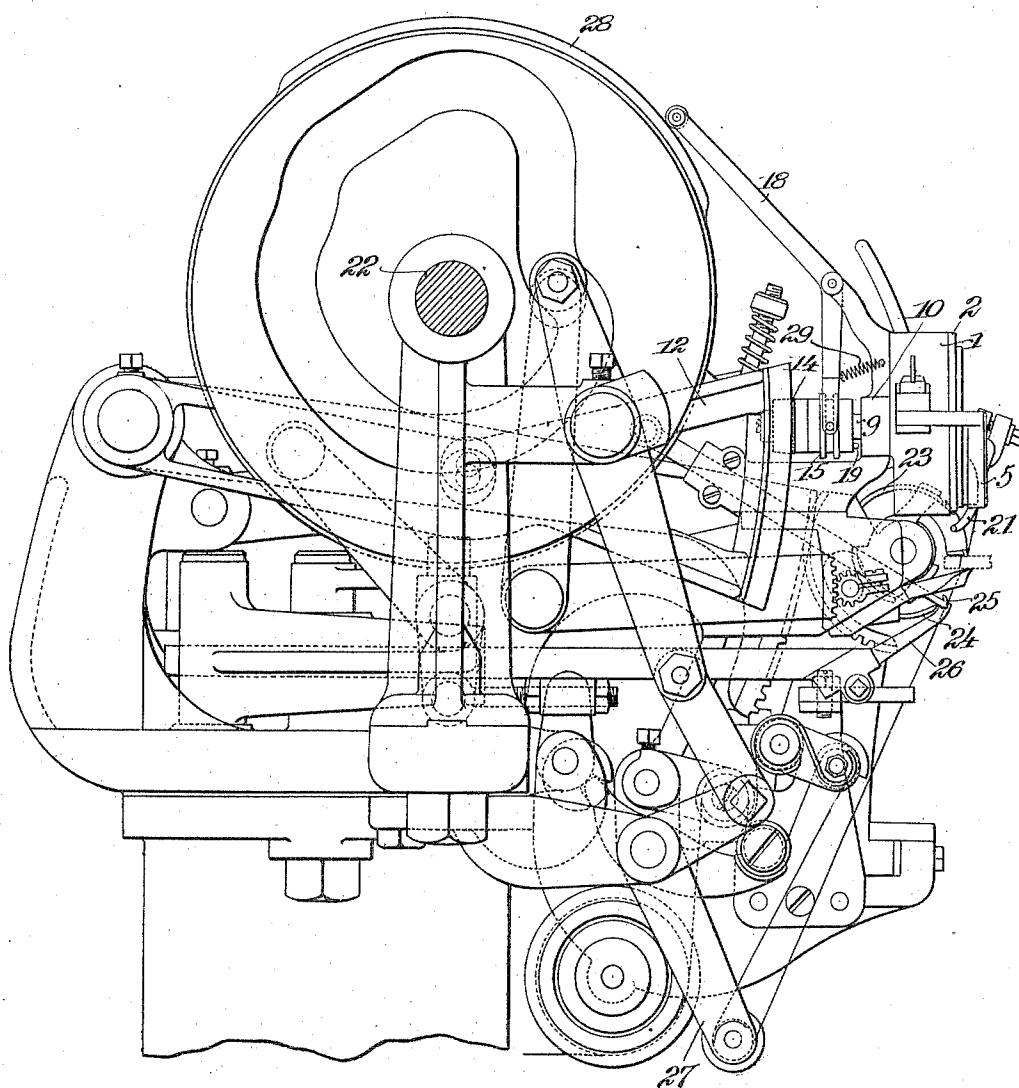
A. B. FOWLER.

SHUTTLE ACTUATING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED JAN. 13, 1902.

2 SHEETS—SHEET 2.

Fig. 3.



Witnesses:
John F. C. Prinslow
And C. Fish

Inventor:
Alfred B. Fowler
by his Attorney
Benjamin Phillips

UNITED STATES PATENT OFFICE.

ALFRED B. FOWLER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHUTTLE-ACTUATING MECHANISM FOR SEWING-MACHINES.

No. 820,964.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed January 13, 1902. Serial No. 89,584.

To all whom it may concern:

Be it known that I, ALFRED B. FOWLER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Shuttle-Actuating Mechanisms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improved shuttle-actuating mechanism for lock-stitch shoe-sewing machines.

Lock-stitch shoe-sewing machines as now usually constructed comprise a curved hooked needle and a discoidal shuttle located in the path of movement of the needle and in a plane at substantially right angles to the plane of the path of movement of the needle, the shuttle having a portion of the periphery cut away or notched to allow the needle to pass therethrough in its movements toward and from the work. During such movement of the needle the shuttle is held stationary, or substantially so, and is then rotated through substantially a complete revolution to pass the shuttle-thread through the loop held by the needle or by a thread-lifter or loop-spreader. It is necessary that the shuttle be actuated in timed relation to the movements of the needle and to the movements of the various other instrumentalities of the machine which cooperate in the sewing operation. To secure this result, two general types of shuttle-actuating mechanism have heretofore been employed, one being arranged to impart to the shuttle an oscillating movement and the other being arranged to impart to the shuttle an intermittent or variable rotary movement in the same direction. On account of its simplicity and compactness of construction and its certainty of operation the type of shuttle-actuating mechanism which has usually been employed is that which is arranged to impart to the shuttle an oscillating movement. This type of mechanism, however, has the disadvantage of imparting to the shuttle an idle movement—that is, a movement which performs no useful function. This idle movement of the

shuttle, which is its backward movement, occupies an appreciable portion of the time during which a complete cycle of operations of the machine takes place and by interfering with the action of certain instrumentalities of the machine diminishes the time which they would otherwise have in which to perform their several functions.

The instrumentality the action of which is directly interfered with by the shuttle during its idle movement is the needle, which must remain in its retracted position during such movement. Since, however, the various instrumentalities of the machine which cooperate in the sewing operation must operate in a certain prescribed order, the movements of certain other instrumentalities are interfered with indirectly and must take place during a smaller portion of the time required for a complete cycle of operations than would otherwise be the case. This necessitates abrupt changes in the contour of the operating-cams, with a consequent loss in speed and in ease and smoothness of operation.

Shuttle-actuating mechanisms which impart to the shuttle an intermittent or variable rotary movement in the same direction as heretofore constructed have consisted of complicated systems of differential gearing or have involved the employment of gears which were meshed and unmeshed during the operation of the machine or have comprised a large number of parts which were, as compared to that type by which an oscillating movement is imparted to the shuttle, complicated in arrangement and operation and occupied considerable space in the machine. Certain of these mechanisms produce two dwells in the rotary movement of the shuttle, one when the shuttle is in a position to allow the needle to move toward and from the work and the other when the shuttle is in a position to allow the loop of thread which has been taken by the shuttle to be discharged therefrom. The movement of the shuttle after the loop of thread has been discharged is an idle movement and interferes with the movement of the other instrumentalities in the same manner as the idle backward movement of an oscillating shuttle. These mechanisms therefore possess the disadvantages

of mechanisms for imparting an oscillating movement to the shuttle and are also objectionable as being more complex in construction and operation and as occupying more space in the machine. The mechanism which involved the meshing and unmeshing of gears was inherently objectionable from a mechanical point of view, because of their uncertainty of operation and liability to accidental or wear-produced derangement.

The object of my invention is to provide an improved shuttle-actuating mechanism for rotating the shuttle intermittently in the same direction without any idle movement, which shall be as simple and compact in construction and as efficient and certain in operation as mechanisms which have previously been utilized to impart an oscillating movement to the shuttle.

With this object in view my invention contemplates, in one aspect, providing a shuttle-actuating mechanism comprising a rotatable shuttle-driver, an oscillatory member, a vibrating member for actuating the oscillatory member having continuous engagement therewith, and means for connecting the shuttle-driver to the oscillatory member and for disconnecting it therefrom, whereby an intermittent rotary movement in one direction is imparted to the shuttle-driver. A mechanism embodying my invention also preferably embodies means for locking the shuttle-driver in position while disconnected from its actuating member, whereby any liability that the shuttle-driver will be displaced and connected to its driving member when their relative positions are such as to cause the shuttle to be actuated out of timed relation to the other instrumentalities of the machine is avoided. By providing such a mechanism I eliminate the meshing and unmeshing of gears and all idle or unnecessary movements of the shuttle which would interfere with the operation of the other instrumentalities of the machine and at the same time secure all the advantages as to simplicity and compactness of construction and certainty of operation of a mechanism for imparting an oscillating movement to the shuttle.

My invention also contemplates certain other features of construction particularly defined in the claims.

In the drawings accompanying this application I have illustrated a preferred form of my invention as applied to the well-known Goodyear rapid stitcher, which is illustrated and described in the patent to French and Meyer, No. 473,870, April 26, 1892. It will be understood, however, that my invention is equally applicable to other lock-stitch shoe-sewing machines and that it can be otherwise embodied without departing from the spirit thereof.

Referring to the drawings, Figure 1 is a view in longitudinal section of a mechanism embodying my invention. Fig. 2 is a view in end elevation of the shuttle-race, the shuttle-driver, the shuttle, and the bobbin, the shuttle being shown in the position in which it is held while the shuttle-driver is disconnected from its actuating member; and Fig. 3 is a view in sectional elevation of the machine disclosed in the patent to French and Meyer, hereinbefore referred to, with my present invention applied thereto, said view corresponding to Fig. 4 of the patent.

Referring to Figs. 1 and 2, 1 indicates the stationary shuttle race or casing, 2 the shuttle-retaining cap, 3 the discoidal shuttle, 4 the bobbin, and 5 the arm, which retains the bobbin in position in the shuttle and prevents it from rotating therewith, the construction and arrangement of these parts being the same as the corresponding parts disclosed in the patent hereinafter referred to. The shuttle-driver consists of two projections 6 and 7, projecting from a plate 8, formed on the end of a shaft 9, mounted to rotate in a boss 10, extending from the rear side of the casing 1, which projections are arranged to engage the shuttle at its rear portion and at the base of its point 11, respectively, these parts being also constructed and arranged as in the patent hereinbefore referred to.

The vibrating member for actuating the shuttle-driver is indicated at 12 and consists of a pivoted lever, the forward end of which is segmental in shape and is provided with a series of gear-teeth 13. This actuating member is of substantially the same construction as the shuttle-actuating segment of the machine disclosed in the patent hereinbefore referred to and occupies substantially the same position in the machine. In the machine disclosed in the patent hereinbefore referred to the shuttle-actuating segment is always connected to the shuttle-driver, so that the oscillating movements of the segment impart an oscillating movement to the shuttle-driver and through the shuttle-driver to the shuttle. The disadvantages accruing from so actuating the shuttle have been referred to above, and in order to overcome these disadvantages I have provided means for connecting the shuttle-driver to the segment while the segment is moving in one direction and for disconnecting it therefrom while the segment is moving in the opposite direction, whereby an intermittent rotary movement in the same direction instead of an oscillating movement is imparted to the shuttle. The means shown in the drawings for accomplishing this result may be described as follows: A pinion 14 is mounted to rotate loosely upon the rear end of the shaft 9 and is in continual engagement with the teeth 13 of the segmental lever 12. A clutch member 15 is splined upon

the shaft 9 between the boss 10 of the casing 1 and the pinion 14, so as to rotate with the shaft and be capable of a sliding movement longitudinally thereof. The adjacent faces 5 of the clutch member 15 and the pinion 14 are provided with clutch devices, whereby the pinion is clutched to the clutch member when the clutch member is moved longitudinally of the shaft into engagement therewith, 10 said clutch devices, as shown, consisting of a pin 16, projecting from the face of the clutch member, and a recess 17 on the face of the pinion shaped to receive the pin 16.

It will be seen that the above-described 15 construction is such that the clutch member 15 can be alternately connected to the pinion 14 and disconnected therefrom by moving the clutch member longitudinally of the shaft 9 toward and from the pinion and that 20 since the pinion is constantly in mesh with the teeth 13 of the segment-lever 12 and the clutch member 15 is splined upon the shaft 9, so as to rotate therewith, such movements of the clutch member act to intermit- 25 tently connect the shuttle-driver to the actuating-lever 12 and to disconnect it therefrom. By moving the clutch member 15 at the proper times with relation to the movement of lever 12 the shuttle-driver may be con- 30 nected to the actuating-lever while the lever is moving in one direction and disconnected therefrom while the lever is moving in the opposite direction, whereby an intermittent rotary movement in the same direction will 35 be imparted to the shuttle-driver and through the shuttle-driver to the shuttle. For so moving the clutch member 15 a bent lever 18 is provided, one arm of which is forked to embrace the clutch member 15 and 40 is connected thereto by pins projecting into a groove in the clutch member, and the other arm of which is engaged by suitable actuating mechanism—as, for instance, a cam on the cam-shaft of the machine.

It will be understood that the cams for actuating the levers 12 and 18 will be so shaped 45 as to cause the clutch member 15 to be moved into engagement with the pinion 14 and be disconnected therefrom at such times 50 during the operation of the machine as will cause the shuttle to be intermittently rotated at the proper times during the sewing operation. The particular shape to be given to these cams will be apparent to those 55 skilled in the art.

In order that the shuttle may be actuated in timed relation with the other instrumentalities of the machine, it is essential that the shuttle-driver be connected to its actuating 60 member when the shuttle and driver and its actuating member are in a certain relative position. To insure this result, I provide means for locking the shuttle-driver in position while disconnected from its actuating

member, whereby the shuttle-driver is held 65 from accidental displacement and will always be connected to its actuating member when the shuttle and its actuating member are in a position to cause the shuttle to be properly actuated, these means preferably 70 becoming operative to lock the shuttle-driver in position before it is disconnected from its actuating member and to release it only after it has been connected to its actuating member. These means, as shown in 75 the drawings, consist of braking or locking devices on the adjacent faces of the boss 10 and the clutch member 15, the faces of the clutch member 15 being provided with a pro- 80 jection 19 and the face of the boss 10 being provided with a recess 20, shaped to receive the pin 19. The movement imparted to the clutch member 15 by the lever 18 is sufficient 85 to disconnect the clutch member from the pinion 14 and bring it into engagement with the end of the boss 10, the pins or projections 16 and 19 and their respective recesses 17 and 20 being of such length that each pin will enter its corresponding recess before the other 90 pin is entirely withdrawn from its recess, so that accidental movement of the shuttle-driver shaft 9 to throw the pins or projections out of operative position cannot occur. A dwell is provided in the cam for actuating the lever 12 at each end of its stroke, so that 95 when the clutch member 15 is shifted in either direction the pinion 14 shall be at rest.

The machine illustrated in the patent here- 100 inbefore referred to, to which my invention is particularly designed to be applied, is provided with a thread-lifter or loop-spreader, (indicated at 21 in Fig. 2,) from which the loop of needle-thread is taken by the point of the shuttle. It will be understood, however, 105 that my invention is equally applicable to a machine in which the shuttle is arranged to take the loop of needle-thread directly from the needle.

The manner in which the above-described embodiment of the present invention is ap- 110 plied to the machine disclosed in the patent to French and Meyer, No. 473,870, will be clearly understood from an inspection of Fig. 3. Referring to this figure, 22 indicates the main driving-shaft of the machine, upon 115 which are secured the cams from which the various parts of the machine are operated. 23 indicates the curved hook-needle, 24 the curved awl, 25 the thread-finger, 26 the looper, and 27 the take-up, these parts being 120 constructed and arranged as in the machine of the patent and being actuated from the cams on the main driving-shaft in the same manner. These parts are the principal elements which cooperate with the shuttle 125 forming a stitch and constitute what is referred to in certain of the claims as the "complementary stitch-forming mechanism."

The other parts (illustrated in Fig. 3,) with the exception of the parts hereinbefore described, are the same in construction, arrangement, and mode of operation as the corresponding parts of the patented machine. The cam for actuating the lever 18 is indicated at 28 and is formed upon the periphery of one of the main cam-disks secured to the driving-shaft 22. This cam acts to move the lever so as to positively force the clutch member 15 into engagement with the pinion 14. The movement of the lever in the opposite direction to move the clutch member out of engagement with the gear and into engagement with the boss 10 of the shuttle race or casing is produced by a coiled spring 29, one end of which is connected to the lower end of the lever and the other to the shuttle-casing. During the operation of the machine the various parts of the complementary stitch-forming mechanism remain connected to the main driving-shaft, so that the complementary stitch-forming mechanism is in continuous operation. The shaft 9, through which the shuttle is driven, is, however, intermittently connected to and disconnected from the main driving-shaft by the movements which are imparted to the lever 18 by the cam 28, so that the shuttle is intermittently rotated in one direction at the proper times during the operation of the complementary stitch-forming mechanism.

Having thus described my invention, I claim as new and desire to secure by Letters Patent of the United States—

1. A shuttle-actuating mechanism, having, in combination, a shuttle, a shuttle-driver shaft, an oscillatory member loosely mounted thereon, a vibrating lever for actuating the oscillatory member, a clutch member slidably mounted upon the shuttle-driver shaft and held from rotation with relation thereto, a stationary braking member and means for moving the clutch member alternately into engagement with the oscillatory member and braking member, substantially as described.

2. The combination with a shuttle and its complementary stitch-forming mechanism of means for intermittently operating said shuttle comprising a shaft, driving connections between said shaft and said shuttle, a member loosely mounted upon said shaft, means for oscillating said member, means for operatively connecting said member and shaft during movement of said member in one direction, and means for locking said shaft against movement during the reverse movement of said member, substantially as described.

3. A shuttle-actuating mechanism, having, in combination, a shuttle-driver, a shuttle-driver shaft, a pinion loosely mounted thereon, a toothed segment meshing with the

pinion, and means for connecting the pinion to the shuttle-driver shaft and for disconnecting it therefrom, substantially as described.

4. A shuttle-actuating mechanism, having, in combination, a shuttle-driver, a shuttle-driver shaft, a pinion loosely mounted thereon, a toothed segment meshing with the pinion, means for connecting the pinion to the shuttle-driver shaft and for disconnecting it therefrom, and means for locking the shuttle-driver shaft in position while the pinion is disconnected therefrom, substantially as described.

5. A shuttle-actuating mechanism, having, in combination, a shuttle-driver, a shuttle-driver shaft, a pinion loosely mounted thereon, a toothed segment meshing with said pinion, a clutch member splined on the shaft, a stationary braking member, and means for moving the clutch member alternately into engagement with the pinion and braking member, substantially as described.

6. In a sewing-machine, the combination with a main driving-shaft, a shuttle, complementary stitch-forming mechanism, and driving connection between said main shaft and said complementary stitch-forming mechanism, of means for intermittently operating said shuttle during the continuous operation of said complementary stitch-forming mechanism, said means comprising a second shaft, driving connection between said second shaft and said shuttle, a gear having movement independent of said second shaft, driving connection between said gear and said main shaft, a clutch adapted to connect said gear and said second shaft, and means between said main shaft and said clutch for causing said main shaft to operate said clutch to alternately connect and disconnect said second shaft and said gear, substantially as described.

7. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle comprising a driving-shaft in driving connection therewith, a gear having movement independent of said shaft, means for reciprocating said gear, a clutch adapted to connect said gear and said shaft, and means for automatically throwing said clutch into position to connect said gear and shaft during movement of said gear in one direction and into position to disconnect said gear and shaft during reverse movement of said gear, substantially as described.

8. The combination with a shuttle and its complementary stitch-forming mechanism, of a main shaft, driving connection between said main shaft and said complementary stitch-forming mechanism, and means for intermittently operating said shuttle without affecting the operation of said complemen-

5 tary stitch-forming mechanism, said means comprising a second shaft, driving connection between said second shaft and said shuttle, a gear having movement independent of
 10 said second shaft, driving connection between said gear and said main shaft, a clutch adapted to connect said gear and said second shaft, and means for operating said clutch from said main shaft, substantially as described.

15 9. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle and comprising a driving-shaft having driving connection therewith, a gear having movement independent of said shaft, a rocking segment cooperating with said gear, means for reciprocating said segment, a
 20 clutch adapted to connect said gear and said shaft, and means for operating said clutch, substantially as described.

25 10. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle comprising a shaft, driving connection between said shaft and said shuttle, a gear loosely mounted upon said shaft, means for reciprocating said gear, means for operatively connecting said gear and shaft
 30 during movement of said gear in one direction, and means for locking said shaft against movement during the reverse movement of said gear, substantially as described.

35 11. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle and comprising a gear having movement independent of said shuttle, a driving member cooperating with said gear,
 40 said driving member having movement other than its shuttle-driving movement, means for locking said driving member against movement, a relatively fixed member, a clutch having gear engaging and releasing
 45 movement independent of said shuttle but movable with said shuttle in the movement of the latter, and means for locking said clutch in engagement with said gear when
 50 said gear-driving member is locked against movement, moving said clutch into locked engagement with said relatively fixed member to break the connection between said shaft and said gear and permit movement of said driving member other than shuttle-
 55 driving movement, and to connect said gear and shuttle during the shuttle-driving movement of said gear-driving member, substantially as described.

60 12. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle and comprising a gear having movement independent of said shuttle, a driving member cooperating with said gear,

said driving member having movement other 65 than its shuttle-driving movement, means for locking said driving member against movement, a relatively fixed member, a clutch having gear engaging and releasing movement independent of said shuttle but 70 movable with said shuttle in the movements of the latter, means for locking said clutch in engagement with said gear when said gear-driving member is locked against movement, moving said clutch into locked engagement 75 with said relatively fixed member to break the connection between said shaft and said gear and permit movement of said driving member other than shuttle-driving movement, and to connect said gear and shuttle 80 during the shuttle-driving movement of said gear-driving member, and means whereby said clutch engages one of the parts to which it is locked before disengaging the other of said parts, substantially as described. 85

13. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle and comprising a driving-shaft in driving connection therewith, a gear having 90 movement independent of said shaft, a reciprocatory gear-driving member, means for locking said driving member against movement, a relatively fixed member, a clutch slidable upon said shaft but rotatable there- 95 with, and means upon said clutch whereby the same can engage either said gear or said relatively fixed member, said means being of such character that said clutch engages one of said parts before disengaging the other 100 thereof, substantially as described.

14. The combination with a shuttle and its complementary stitch-forming mechanism, of means for intermittently operating said shuttle and comprising a driving-shaft in 105 driving connection therewith, a gear having movement independent of said shaft, a reciprocatory gear-driving member, a clutch slidable upon said shaft but rotatable there- with, said clutch being adapted to engage 110 said gear, and means whereby, said clutch being in closed position connecting said gear and said shaft and said clutch-driving member being at the end of its clutch-driving movement said gear-driving member rests 115 and during this period of rest said clutch is thrown into open position, said gear-driving member then moves backwardly, said gear-driving member then rests and during this period of rest said clutch moves into closed 120 position, and said gear-driving member then moves forwardly to drive the said shaft, substantially as described.

15. A shuttle-actuating mechanism, having, in combination, a shuttle-driver, an os- 125 cillatory member, a vibrating lever for actuating the oscillatory member having continuous operative engagement therewith, and

means for connecting the shuttle-driver to the oscillatory member and for disconnecting it therefrom, substantially as described.

16. A shuttle-actuating mechanism, having, in combination, a shuttle-driver, an oscillatory member, a lever and cam for actuating the oscillatory member, said lever and oscillatory member being in continuous operative connection, and a clutch and suitable

connections for connecting and disconnecting the oscillatory member and shuttle-driver, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED B. FOWLER.

Witnesses:

FRED O. FISH,
HORACE VAN EVEREN.