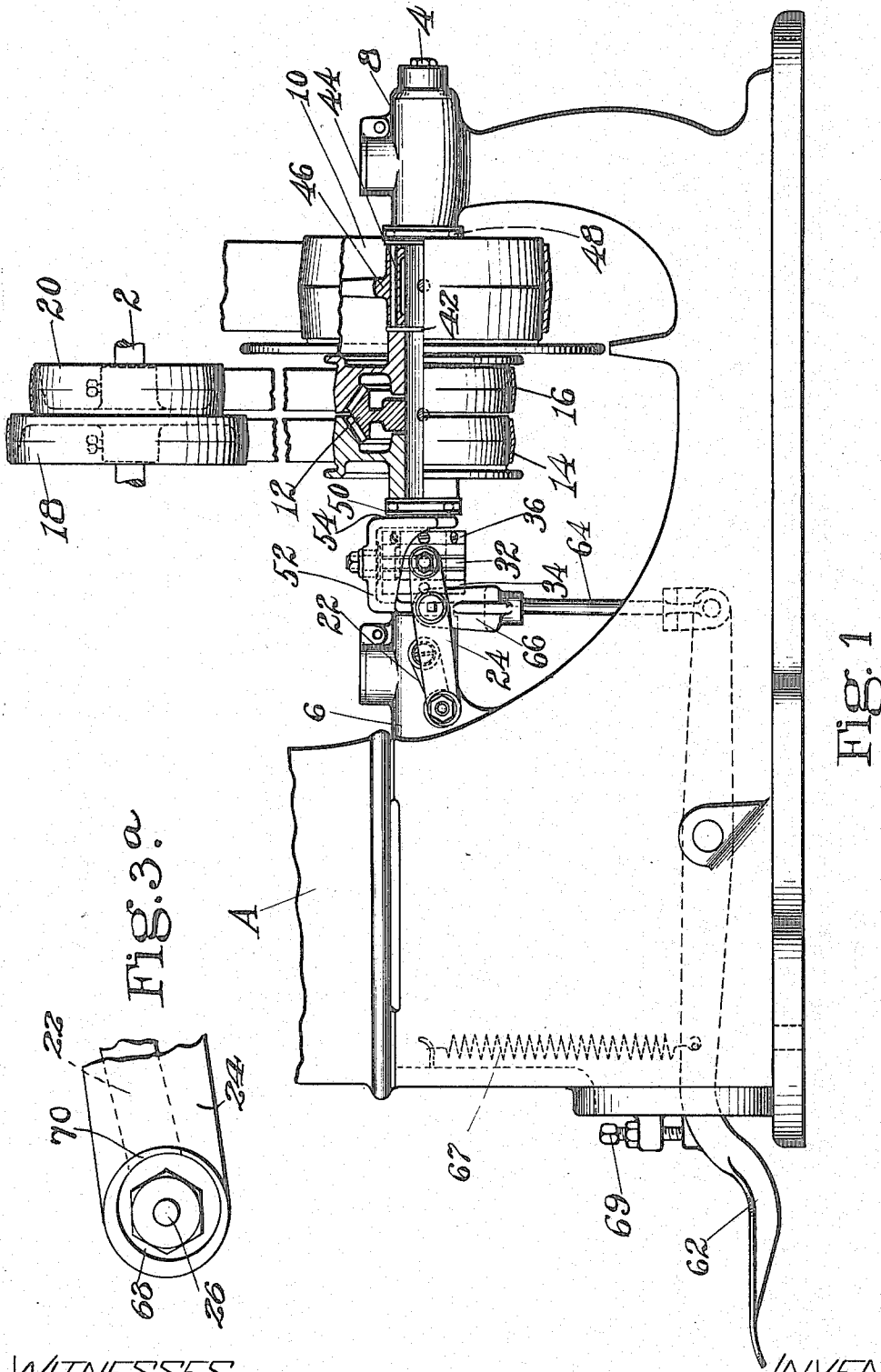


W. T. B. ROBERTS & J. H. BROWN.
VARIABLE SPEED MECHANISM.
APPLICATION FILED DEC. 20, 1910.

1,129,906.

Patented Mar. 2, 1915.

2 SHEETS—SHEET 1.



WITNESSES:

O. Blanche Hargraves.
Elizabeth C. Crisp

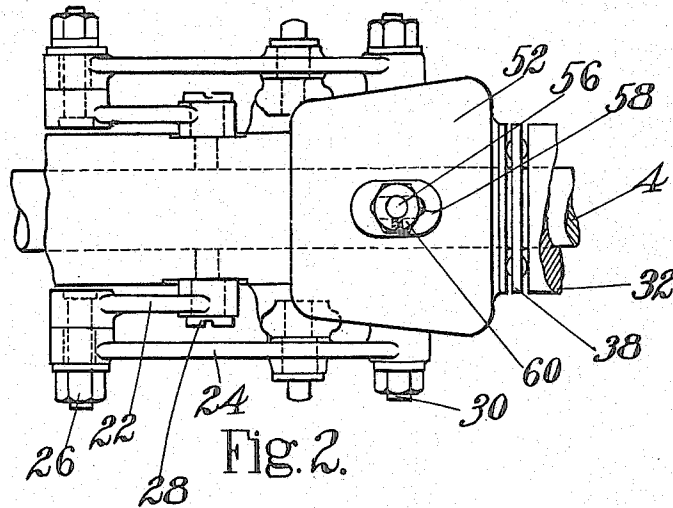
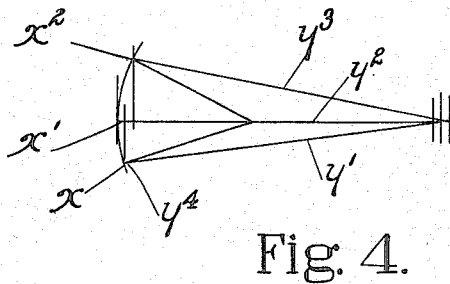
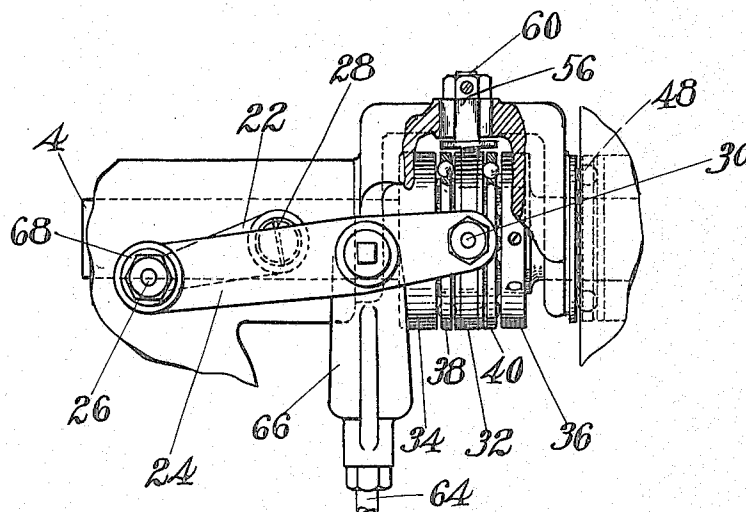
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Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM THOMAS BUCKINGHAM ROBERTS AND JOHN HENRY BROWN, OF LEICESTER, ENGLAND, ASSIGNORS TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

VARIABLE-SPEED MECHANISM.

1,129,906.

Specification of Letters Patent.

Patented Mar. 2, 1915.

Application filed December 20, 1910. Serial No. 598,433.

To all whom it may concern:

Be it known that we, WILLIAM T. B. ROBERTS and JOHN H. BROWN, subjects of the King of England, residing at Leicester, Leicestershire, England, have invented certain Improvements in Variable-Speed Mechanisms, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to speed changing mechanisms for use in machines employed in the manufacture of boots and shoes, and is hereinafter described as applied to a lasting machine of the type in which operations are carried on around the margin of a shoe bottom, and in which different parts of an upper are successively pulled over and tacked; an example of which type is described in the specification of United States Letters Patent No. 584,744, dated June 15, 1897.

Heretofore lasting machines of the type referred to have usually been operated at a substantially uniform rate of speed for all portions of the work. It has been found, however, advantageous to run the lasting machine at a higher speed in operating along the sides of the shoe, or at the heel, than when the curved portion at the toe is operated upon.

Accordingly an object of the present invention is to provide an improved variable speed mechanism or speed controlling means arranged to enable different parts of an upper to be lasted successively at different rates of speed, means being provided whereby each portion of the upper can be operated upon as rapidly as is consistent with the work to be done upon that part. To attain this and other objects it is, however, of prime importance that the mechanism provided shall be so quick and positive in operation that a minimum of time shall be required for the operator to shift from one speed to another in order that no time shall be lost in presenting successively to the lasting devices all the different parts of the work, and in order that, for example, in going from the side of the shoe to the toe portion, there will be no necessity for the operator to wait for the speed shifting mechanism to operate. In other words, it is essen-

tial that the operator be able to adapt the speed at which the lasting devices are run to the needs of each particular part of the stock the moment that part of the stock is encountered by these devices.

Hence, another object of our invention is the production of a speed controlling means which will be found to be simpler, as well as quicker, more efficient and reliable in operation than any heretofore available. Moreover our invention contemplates a speed-controlling means which, while suitable for use in any machine in which it is desirable that the speed should be varied, is nevertheless peculiarly adapted for use in connection with a machine of the type referred to, and to attain the objects stated.

To attain these objects, and other objects, our invention comprises in a preferred embodiment thereof a twin clutch device and actuating means therefor; the said actuating means being preferably and as herein shown so arranged that by the continued movement of an actuating member said means operates the clutch device first in one direction and then reversely to clutch it to a plurality of speed members successively. To insure positive and rapid engagement and disengagement of the clutch device with the respective speed members successively, the clutch device is preferably fixed upon a counter shaft which is journaled in the base of the machine and arranged for endwise movement in its bearings so that the continued movement of an actuating member controlled by the operator will operate through suitable connections which preferably comprise a collar and toggles to shift the said shaft longitudinally first in one direction and then in the other to the required extent, thereby bringing the clutch surfaces into clutching engagement successively with a pair of speed members between which the clutch device is disposed. Preferably, too, the aforesaid speed members or loose pulleys on the counter shaft are belted to fixed pulleys on the main cam shaft of the machine; the said pulleys being proportioned to drive the cam shaft at different speeds. This arrangement insures that all the said pulleys will be rotated together so that the clutch, when shifted from one speed member to another, will pick up and connect to the counter-shaft a cam shaft driving pul-

ley which will be already in motion. Hence, the inertia ordinarily encountered in shifting from one speed to another will be negligible.

5 Another feature of this invention, is the provision of efficient anti-friction devices to sustain the end thrust of the speed members and of the means for actuating the clutch device.

10 These and other features and advantages of the present invention will clearly appear from the following detailed description read in connection with the accompanying drawings which show a preferred embodiment thereof applied to a machine of the type referred to in the aforesaid Letters Patent. 15 It is to be understood, however, that the invention is not to be construed as in any way limited in its application to this type of machine or to the particular construction shown and described merely by way of illustration.

Referring to the drawings:—Figure 1 is a side elevation of the lower portion of a machine of the type set forth in said prior 25 Letters Patent showing the counter shaft and variable speed mechanism partly in section. Fig. 2 is a plan of a portion of the actuating means for operating the clutch. Fig. 3 is an elevation showing in detail the said actuating means partly in section, and drawn to a scale larger than that of Fig. 1. Fig. 3^a is an enlarged detail view of a portion of the clutch actuating means. Fig. 4 30 is a diagrammatic representation of the operation of a part of said actuating means.

The machine to which, by way of illustration, this invention is described as being applied, comprises a column A that supports 40 a framework or head in which is journaled the main shaft 2 (Fig. 1), of the machine upon which are the cams and gears which give the proper motions to the several mechanisms for operating the various lasting devices, as is fully described in the above mentioned Letters Patent, and of which, therefore, further description herein is unnecessary. In the base of the column aforesaid, is journaled a first motion or counter-shaft 50 4. This counter-shaft 4 is journaled at opposite ends in bearings 6 and 8, and has rigidly secured to it so as to revolve therewith a driving pulley 10 which receives its motion from any suitable source of power. To another part of said shaft 4 is also fixed a clutch member 12 (Fig. 1) which preferably, as shown, is double coned, each friction surface thereof being adapted to be brought as hereinafter explained into engagement with 60 one or the other of similar and corresponding clutch surfaces formed upon pulleys 14 and 16, the said pulleys 14 and 16 being loosely mounted on the shaft 4 at opposite sides of clutch member 12, and each of said 65 pulleys being securely held against outward

movement away from the clutch member 12. These loose pulleys 14, and 16 which form parts of a twin clutching device may be adapted to transmit the drive from the counter-shaft 4 to the main cam shaft 2 of the machine through belt connections with different sized pulleys 18, 20 fixed on the main shaft 2 as shown in Fig. 1 or the counter-shaft pulleys 14, 16 may be of different dimensions and the main cam shaft pulleys 70 equal sized. In either case the speed of operation of the various lasting devices referred to may be varied as desired by bringing the double faced clutch member 12 into engagement with one or the other of the said pulleys 14, 16. Moreover, as suggested above by reason of the belt connections between the loose pulleys 14, 16 on shaft 4 and the fixed pulleys 18, 20 on shaft 2, whenever the machine is running all the said pulleys 85 will be rotated together. Hence, whenever the clutch member 12 is shifted from one to the other of the driving members 14, 16 to change the speed of shaft 4, it will pick up and connect to shaft 4 a cam shaft driving 90 member that is already in motion when its connection with the said shaft 4 is effected.

The aforesaid double coned member 12 as shown in Fig. 1 is normally in an inoperative or disconnected position. To enable 95 this clutch member 12 to be brought from its inoperative position into engagement first with one and then with the other of the frictional surfaces formed upon the loose pulleys 14, 16, the counter-shaft 4 is mounted for 100 endwise movement in its bearings 6 and 8, so that by shifting the said shaft 4 longitudinally thereof first in one direction and then in the opposite direction to the required extent, the clutch surfaces of the friction member 12 which is fast on the shaft 4 105 are brought successively into clutch engagement with the respective friction surfaces formed upon the loose pulleys 14, 16.

To actuate the counter-shaft 4 for movement endwise means comprising a collar and toggle and pedal connections as above 110 stated may conveniently be provided. As shown, twin toggles 22, 24 are positioned one on one side of shaft 4 and the other on the opposite side of shaft 4 (Figs. 1 and 2) each 115 comprising a short link 22 and a relatively long link 24, these links 22, 24 of each toggle being pivoted together by a pin 26. The short member of each toggle is fulcrumed to a pin 28 on the machine frame, and pivot pins 30 connect the other ends of the long links 24 to a collar 32 on the counter shaft 4, the arrangement being such as to constitute 120 what may be termed inverted toggles. The collar 32 to which links 24 are pivoted at their rear ends is mounted loosely on the shaft 4 so as to be free from turning therewith, but is prevented from longitudinal movement 125 on the shaft 4 by a flange 34 formed thereon, 130

and a collar 36 rigidly fixed to said shaft as by suitable screws (Fig. 3). Thus it will be seen that whenever the said collar 32 is actuated to move longitudinally by means of the aforesaid toggle connections the shaft 4 will be thereby given a corresponding endwise movement.

In order effectually to prevent the chafing and wearing away of collar 32 which would naturally result from frictional contact with flange 34 on the one side, and collar 36 on the other side, an anti-friction ball carrying collar 38 is mounted on shaft 4 between the said loose collar 32 and the flange 34, and a similar anti-friction collar 40 is positioned between the collar 32 and the collar 36. Similarly anti-friction devices are provided for sustaining the thrust of loose pulleys 14, 16 as above stated. The thrust of loose pulley 16 is provided for by means of a washer 42 sustained by thrust rods 44 passing through holes in the boss 46 of the fixed driving pulley 10 (Fig. 1) and having at their other ends a ball thrust collar 48 which is prevented from longitudinal movement along shaft 4 by reason of its engagement with the bearing 8. In like fashion, the thrust of the loose pulley 14 is sustained by means of a ball thrust collar 50 embracing the counter-shaft 4 and abutting against a face 54, formed upon a casting 52 which is adapted to embrace the collar 32, and which abuts against the bearing 6.

To provide for the longitudinal movement of the collar 32, which as aforesaid, is necessarily coincident with every endwise movement of shaft 4, the said collar 32 is formed with a shank 56 which projects through a slot 58 in the casting 52 and which is held in position by a ring 60, (Figs. 2 and 3).

The toggles 22, 24 are preferably actuated by means of the pedal 62. This pedal 62 is coupled to a rod 64, the upper end of which is provided with a yoke 66, each arm of said yoke 66 being connected to one of the toggle links 24, so that when the pedal 62 is depressed, the toggles 22, 24 are brought into action, and through their connections with collar 32 the counter-shaft 4 is moved endwise, the construction being such, as will readily be understood, that clutch member 12 is thereby positively and quickly actuated into engagement with one or the other of the said members 14, 16. Moreover this arrangement is such, that by reason of the construction just described, the speed controlling means is always absolutely within the control of the operator.

Each of the toggles 22, 24 is preferably so arranged that when the joints 26 of the toggles are in a position below the center of the counter-shaft 4 as shown in Fig. 1 the coned friction member 12 is in its neutral or inoperative position, that is, discon-

nected from both of the loose pulleys or speed members 14, 16. When, however, upon the depression of treadle 62, the joints 26 of the toggles 22, 24 are raised, and the links 22, 24 are thereby brought into a central or straightened position, the loose pulley 14 on the counter-shaft 4 will be immediately clutched to the coned friction member 12; while upon further continued movement or depression of treadle 62 resulting in farther upward movement of said toggle joints 26, the friction cone 12 will be moved reversely to unclutch the pulley 14, and to clutch the pulley 16. The pedal 62 is depressed against the tension of a spring 67, which has its upper end fixed to a hook in the machine frame and its lower end secured to a pin on the pedal 62; the said spring 67 acting normally to keep the pedal 62 in the elevated position shown in Fig. 1 as well as operating to return the said pedal 62 to its elevated position when released by the operator after every depression thereof. The position in which the pedal is stopped when it is freed, and therefore the position in which the clutch member 12 normally stands, is determined adjustably by a stop screw 69 arranged in the frame for engagement by the treadle. By setting this stop up or down the extent of treadle movement required to throw the clutch member 12 into engagement with the low speed pulley 14 can be varied. This arrangement of the toggle connections and their actuating member whereby continued downward movement of pedal 62 results in imparting endwise movement to shaft 4 so as to operate clutch device 12 first in one direction, and then reversely to clutch it to speed members 14, 16 successively, is, as indicated before, a chief feature of our invention, and it should be noticed that, when clutch device 12 is in its neutral or inoperative position with relation to loose pulleys 14, 16, a very slight depression of treadle 62 from its normally upward position serves to clutch friction member 12 with the slow speed pulley 14, and a similarly slight further depression of treadle 62 suffices to throw the high speed pulley 14 immediately into clutch, so that a very rapid shifting of the speed mechanism is insured.

The operation of the toggle actuator for the variable speed mechanism just explained above, is well illustrated diagrammatically in Fig. 4 in which the points x , x^1 , x^2 , respectively represent the three positions of the pins 26 which correspond respectively to the positions of the clutch member 12 when the latter is inoperative, when it is in clutch with the loose pulleys 14, and when it is in clutch with the pulley 16. The lines y^1 , y^2 , y^3 , represent the three corresponding positions of the links 24. It will be seen that in the first position, which corresponds

with the showing of the parts on Fig. 1, the end y^4 of the line y^1 is at the point x , in the second position the end of the line y^2 is at the point x^1 , and in the third position, the end of the line y^3 is at the point x^2 .

It is desirable to enable the effective length of each of the toggles 22, 24 to be varied in order to compensate for wear on the friction clutch surfaces and other parts, or for varying the pressure with which the coned friction member 12, and loose pulleys 14, 16 are brought into engagement with each other. Accordingly each of the pins 26 secures to the link 22 a bushing 68 having an eccentric exterior 70 (Fig. 3^a) that forms the pivot of the toggles 22, 24, and is adapted to be rotatably adjusted manually about the pin 26 so that it will move the link 24, and consequently the clutch member 12 longitudinally.

We are aware of co-pending United States application, Serial No. 569,025, filed June 27, 1910, and do not claim anything therein claimed; but

Having thus described our invention, what we do claim as new and desire to secure by Letters Patent of the United States is:—

1. A speed changing mechanism having, in combination, a driving member, driven members, a manually movable actuating member, connections from said actuating member to the driving member constructed to effect, through movement of the actuating member in one direction, movements of the driving member alternately in opposite directions and into operative relation successively to different driven members, and automatic means for positioning said parts to maintain the driving member normally out of operative relation to the driven members.

2. A speed changing mechanism having, in combination, an endwise movable shaft, a plurality of driven members loose on the shaft, a clutch member fixed on the shaft between said driven members, a manually movable actuating member, connections from said actuating member to the shaft constructed to effect, through movement of the actuating member in one direction, movements of the shaft alternately in opposite directions to bring the clutch member into operative relation first to one and then to the other of said driven members, and automatic means for positioning said parts to return the clutch member to a position in which it is out of operative relation to the driven members.

3. In a machine having a plurality of power transmission trains, a clutch device arranged for movement alternately in opposite directions into power transmitting relation successively to different trains, a manually movable actuating member, connec-

tions from said actuating member to said device constructed to effect movement of the device alternately in opposite directions on a movement of the actuating member in one direction, and automatic means for positioning said parts to maintain the clutch device normally out of operative relation to said transmission trains.

4. A machine of the class described, having in combination a plurality of speed members, a clutch device arranged to move alternately in different directions to effect successive clutching of different speed members, toggles for effecting the said movements and a manually controlled member having operative movement in one direction for operating the toggles.

5. In apparatus of the class described, the combination with clutch mechanism comprising driving and driven members arranged for relative movements alternately in opposite directions to effect successive clutching engagements therebetween, of means for actuating said mechanism comprising a manually movable actuating member and connections therefrom to said mechanism including a toggle arranged to be successively straightened and broken through movement of said actuating member in one direction.

6. A speed changing mechanism having a plurality of driven members, a double cone friction clutch device, a manually controlled operating member, toggle connections between said clutch device and said operating member to cause movement of the operating member in one direction to effect movement of said clutch device alternately in different directions, and means for controlling said operating member and said connections to cause the clutch device to be normally centered in inoperative relation to the driven members.

7. A speed changing mechanism having a driving shaft, a plurality of driven members on the said shaft, a clutch device on said shaft, and means for actuating the said clutch device, said means comprising a manually controlled actuating member having movement in one direction, and toggle connections between said actuating member and said clutch device whereby the said clutch device is moved alternately in opposite directions into engagement with said driven members successively.

8. In apparatus of the class described, the combination with clutch mechanism comprising driving and driven members arranged for relative movements alternately in opposite directions to effect successive clutching engagements therebetween, of automatic means for positioning the parts to maintain said driving and driven members normally in inoperative relation, a manually movable actuating member, and connections

from said actuating member to the clutch mechanism arranged to effect said relative movements of the parts thereof in opposite directions through movement of the actuating member in one direction.

9. In apparatus of the class described, the combination with a clutch member and co-operating clutch mechanism, of a manually movable actuating member for the clutch member, and means to effect clutching movements of the clutch member alternately in opposite directions through movement of said actuating member in one direction comprising a member arranged to be rotated through said movement of the actuating member, and a link connected to the clutch member and pivoted to said rotatable member in position to be reciprocated upon the rotation of said rotatable member.

10. In apparatus of the class described,

the combination with a clutch member and coöperating clutch mechanism, of a manually movable actuating member for the clutch member, and means to effect clutching movements of the clutch member alternately in opposite directions through movement of said actuating member in one direction comprising a toggle connected to operate the clutch member and arranged to be successively straightened and broken through said movement of the actuating member.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM THOMAS BUCKINGHAM ROBERTS.

JOHN HENRY BROWN.

Witnesses:

ARTHUR ERNEST JENAU,
ELEANOR PYWELL.