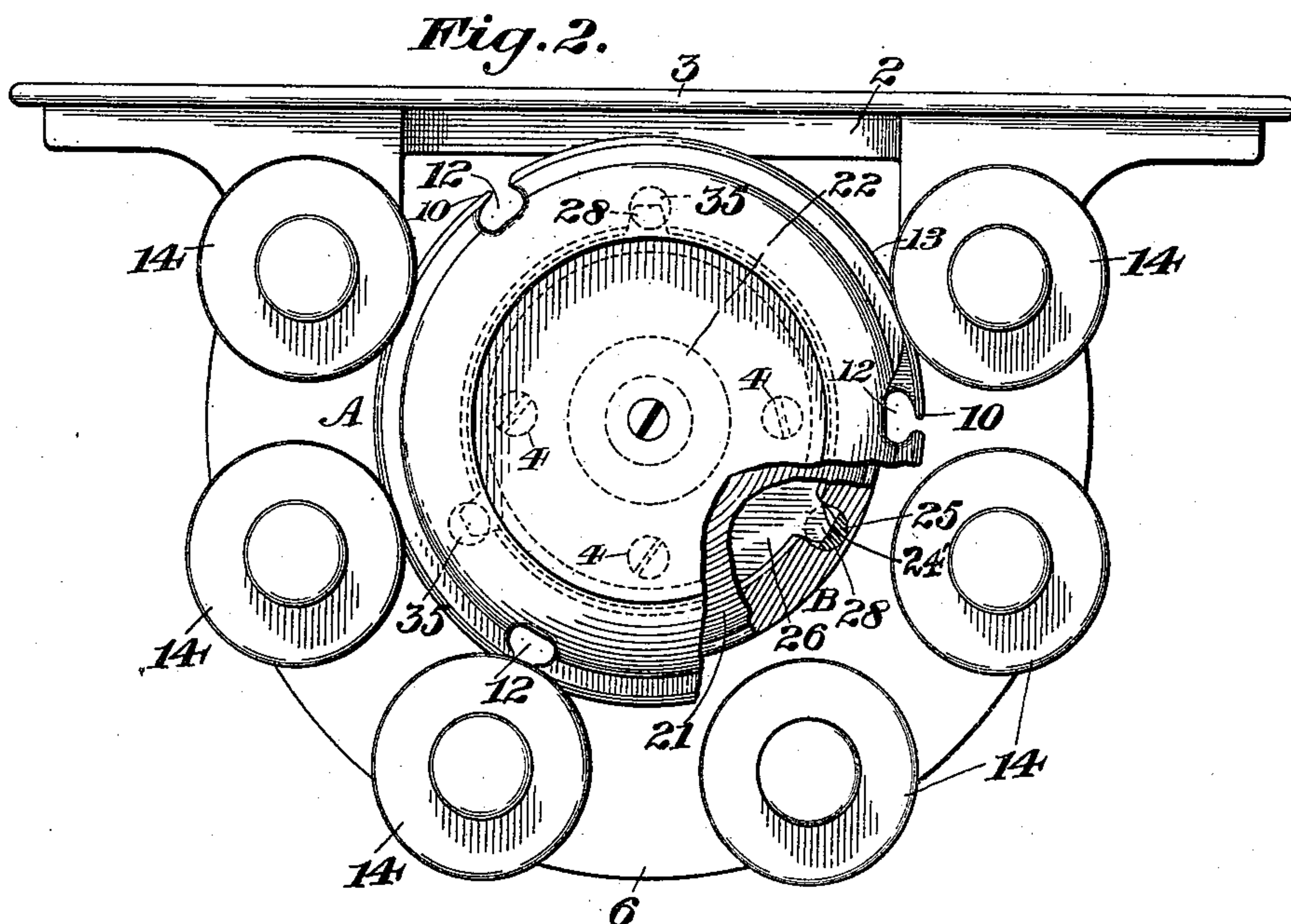
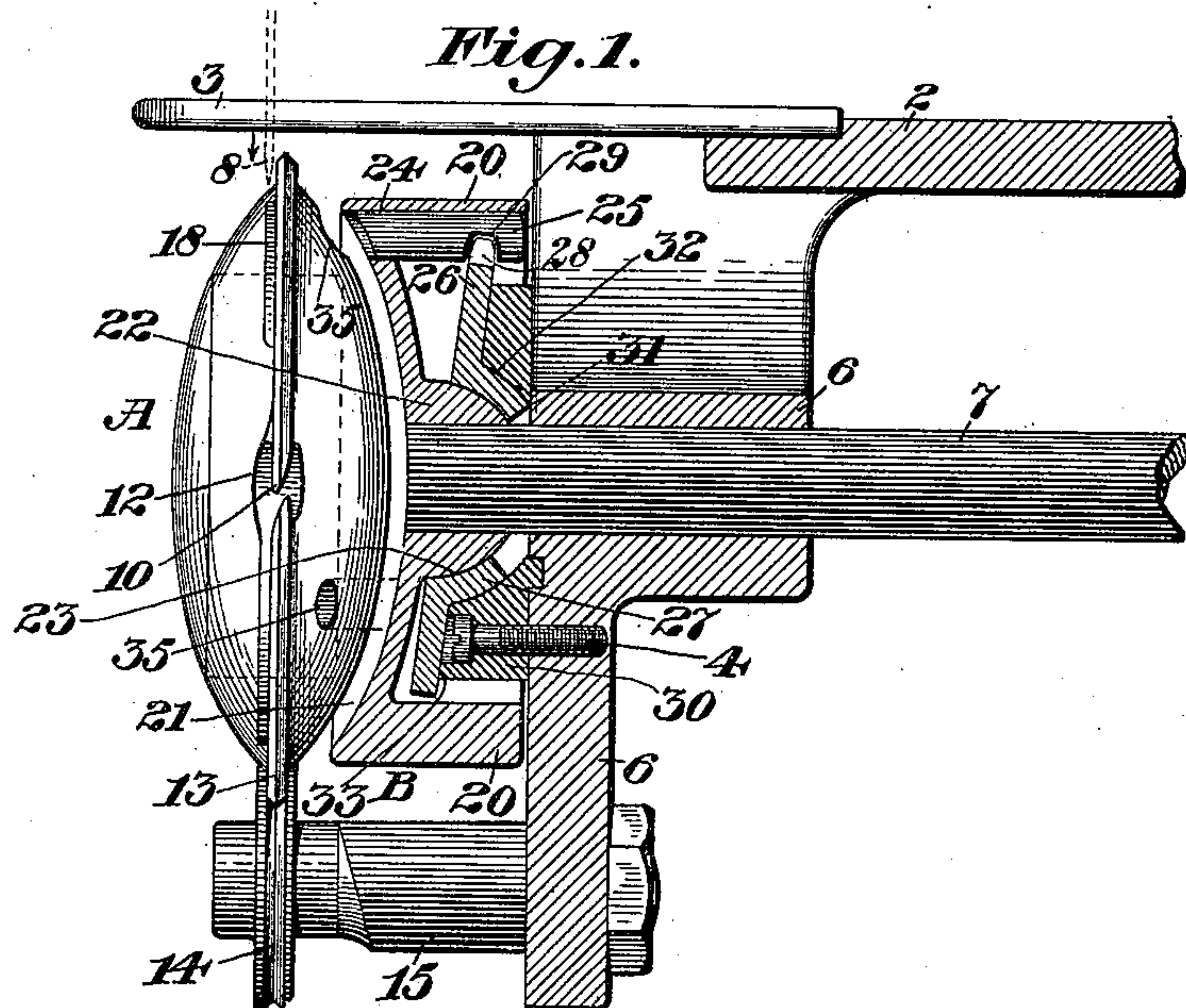


(No Model.)

2 Sheets—Sheet 1.

F. H. RICHARDS.  
ACTUATING MECHANISM FOR SEWING MACHINE LOOPERS.  
No. 602,105. Patented Apr. 12, 1898.



Witnesses;  
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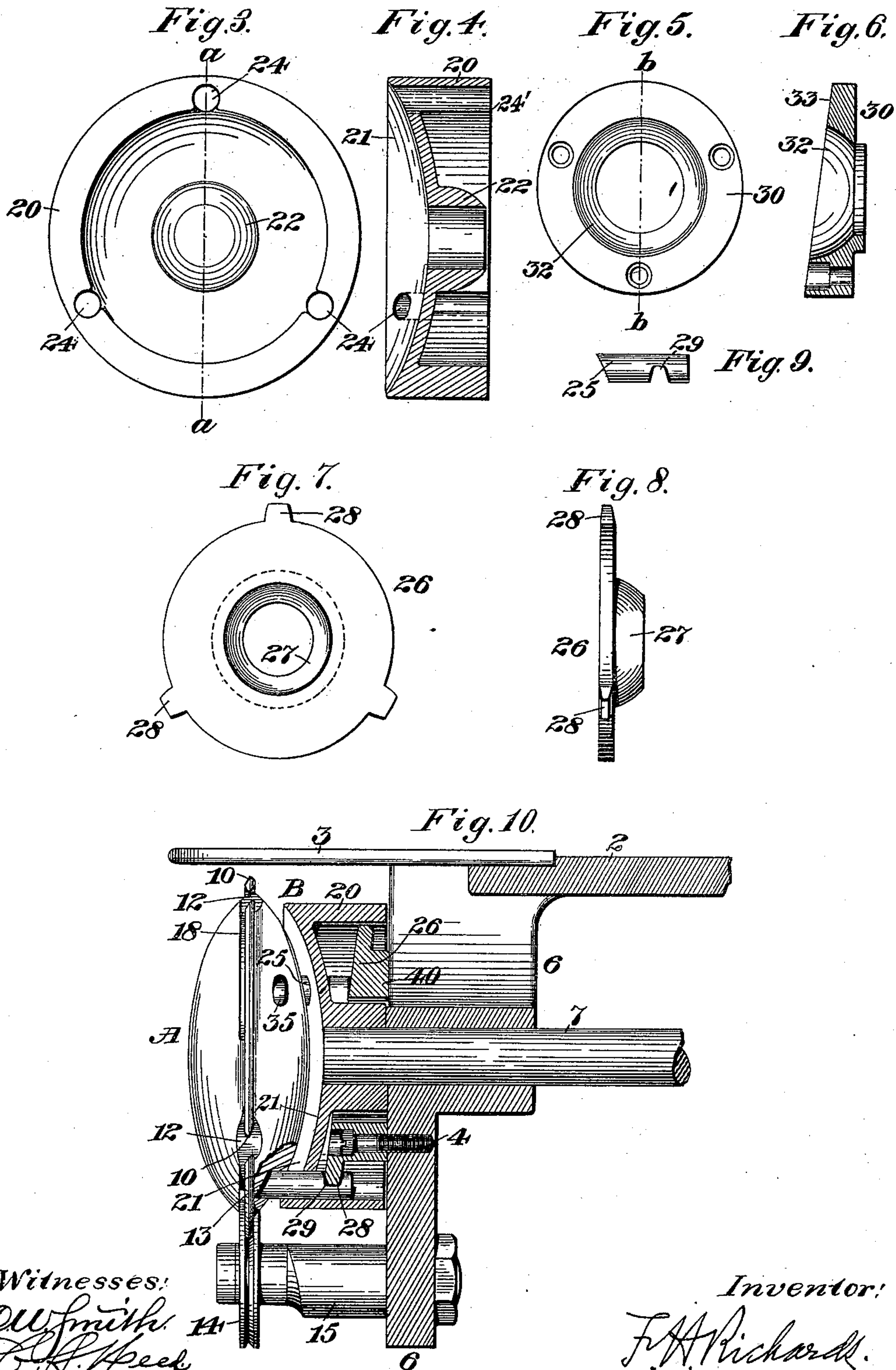
Inventor,  
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# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

## ACTUATING MECHANISM FOR SEWING-MACHINE LOOPERS.

SPECIFICATION forming part of Letters Patent No. 602,105, dated April 12, 1898.

Application filed January 14, 1897. Serial No. 619,200. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Looper Mechanism for Sewing-Machines, of which the following is a specification.

This invention relates to looper mechanisms for sewing-machines of that class in which a rotatable looper or shuttle is employed for engaging a needle-loop and carrying it entirely around the same to inclose a second or lower thread or to permit a succeeding loop to be carried therethrough to thus form a stitch, the object thereof being to provide an improved mechanism of this character comprising a rotatable looper and driving mechanism in which the latter will embody laterally-movable driving means operable simultaneously with its revoluble movement in a plane transverse to its plane of revolution, whereby said driving means will gradually engage and release the looper to actuate the same, and thus obtain a driving mechanism operable with a high degree of precision and accuracy and in which also both said looper and driving means can have a common axis and yet permit the driving means to revolve in a path oblique to the plane of rotation of said looper.

In the drawings accompanying and forming part of this specification, Figure 1 is a front view of a looper and a vertical sectional view of one form of driving mechanism in position below the throat-plate of a sewing-machine. Fig. 2 is a left-hand end view thereof, partly broken away. Fig. 3 is a side view of the casing of the driving member detached. Fig. 4 is a cross-sectional view thereof, taken in line *a a*, Fig. 3. Fig. 5 is a side view of the inclined member or block that gives the lateral or transverse movement to the drivers. Fig. 6 is a cross-sectional view thereof, taken in line *b b*, Fig. 5. Fig. 7 is a side view of the actuating member for the drivers. Fig. 8 is a front or edge view thereof. Fig. 9 is a detail view of a driver or driving-pin; and Fig. 10 is a view similar to Fig. 1 and shows another form of looper mechanism, in which the actuating member is stationary.

Similar characters designate like parts in all the figures of the drawings.

As a preface to a description of this improved looper mechanism, it will be understood that the driving mechanism may embody any desired number (sufficient to operate the looper) of movable drivers or driving members; but for the purposes of illustration the same has been shown herein in one form thereof having a series of three drivers, and, furthermore, it will be understood that the various details may be more or less modified without departing from the scope of this invention.

In view of the fact that this improved looper mechanism can be used with various constructions of sewing-machines only so much of the framework of a well-known form of sewing-machine is herein shown as is deemed necessary to illustrate the operative relation of this looper mechanism therewith, and it comprises the usual bed-plate 2, provided with a throat-plate 3, having the usual feed and needle apertures. The bed-plate is provided with a downwardly-extending bracket 6, in which one end of the looper-mechanism driving-shaft 7 is journaled, such shaft in this construction having its axis in parallelism with the bed or throat plate and ordinarily at right angles to the path of movement of the needle 8.

The looper mechanism comprises, in a general way, a looper or shuttle (designated generally by A) supported for rotation, and driving mechanism, (designated in a general way by B,) and which driving mechanism comprises a plurality of independent laterally or transversely movable or sliding drivers or driving members and means for actuating the same simultaneously with the rotary movement of the driving mechanism and the revolution of the drivers.

The looper or shuttle A, which is shown of discoidal form, may be of any preferred construction so far as the loop-takers and the general contour of the same are concerned; but it is herein illustrated, for the purposes of this specification, as convexo-convex, whereby it can have the usual bobbin or cop chamber, and in this instance it has a series of three loop-takers 10, each of which is formed



by a peripheral recess 12, thus forming such loop-takers in the nature of hooks.

The peripheral track 13 of the looper, which is preferably V-shaped in cross-section, is herein shown guided and supported by a series of track-rolls 14, having V-shaped peripheries, and which rolls are carried on adjustable supports 15, secured to the bracket 6. In the structure shown six of these track-rolls are shown, although a less number thereof could be used.

It will be observed that the looper may also be supported or guided by other means, such as a continuous track, if desired.

The looper, which has its axis in alinement with the axis of the driving-mechanism shaft 7, and therefore ordinarily at right angles to the path of the needle, is provided with slots 18, in which the needle works. It is obvious, however, that loopers of various forms other than that herein shown may be used with this improved driving mechanism—such, for instance, as the character of loopers shown and described in my previous applications, Serial No. 606,103, filed September 17, 1896, Serial No. 609,200, filed October 17, 1896, and Serial No. 604,993, filed September 5, 1896.

In the preferred form thereof herein shown and described the driving mechanism, which is mounted on the driving-shaft 7 in the manner hereinafter set forth, comprises a support, preferably in the nature of a casing 20, which is shown skeleton in form and has its outer wall 21, which is contiguous to the looper, preferably conforming to the shape of the adjacent convex side of such looper, and thus herein shown as concaved, and has an inwardly-extending sleeve or hub 22, secured in any desired way on the end of said driving-shaft 7 for rotation therewith, the outer surface 23 of this hub being curved or convex, and thus constituting one member, to a certain extent, of a universal joint. The casing is provided with a plurality of apertures or openings 24, extending from the front to the rear thereof, thereby constituting bearings or chambers for the drivers or driving members, and which bearings are so disposed around the casing that they will guide the drivers into position to engage and release the looper at the proper time to permit the drawing out and the drawing up of the needle-loops, which requires the drivers to be out of engagement with the looper during a certain portion of its rotation and while the same is adjacent to the throat of the throat-plate, and which can be determined in each instance in connection with the desired size and construction of looper and the particular disposition of the driving mechanism relatively thereto. These bearings or chambers also constitute the means for rotating the actuating member 26, as hereinafter described.

The drivers or driving members are shown in the nature of pins 25, and in the present form of mechanism such mechanism is provided with a series of three pins equidistantly

disposed relatively to each other, although it is obvious that the number of such drivers may vary and that they may be disposed in any other desired way. These drivers 25, which have a movement transversely or laterally relatively to the casing and the looper, are disposed one in each of the casing-chambers 24, whereby they are held and guided in position for sliding movement simultaneously with the rotary movement of the casing. The preferred means for actuating these pins laterally or transversely of the casing and simultaneously with their revoluble movements comprises a pin-reciprocating actuator or actuating member 26, preferably disk-shaped and having an interiorly and exteriorly transversely-curved or concavo-convex hub or sleeve 27, adapted to fit on the convex face 23 of the hub 22 of the casing 20 for rotation therewith and thus constituting the other member of the universal joint, which in this instance to a certain extent is in the nature of a ball-and-socket joint. This hub 27 is cut off adjacent to its end in order to permit said actuating member to adjust itself or move relatively to the hub of the casing in the usual manner of universal joints.

The actuating member 26 is provided with a series of radial projections 28, corresponding in number with the number of drivers, one entering each bearing-chamber 24 and engaging each driver, and for this purpose each of said drivers is formed as a transversely-recessed shuttle-driving pin, it being provided with a transversely-extending recess or slot 29, into which one of the projections extends and which is prevented from detachment therefrom by the side walls of the driver-chambers 24, the under walls of which chambers are slotted, as at 24', to permit the projections to extend therethrough and engage the drivers. As above stated, the said member 26 is caused to rotate with the casing 20 by the engagement of the projections 28 with the walls of the chambers 24. To support this actuating member 26 with its axis in angular relation to the axis of the driving-shaft 7 and thereby operate the drivers toward and from the looper as said actuating member is rotated, a suitable member in the nature of an inclined block 30 is fixedly secured by suitable fastening devices, such as screws 4, to the face of the bracket 6 and disposed within the rear of the casing. This block is provided with an opening or recess 31, having a curved or concaved wall 32, and into which recess the convex face of the hub 27 of the actuating member 26 fits and rotates, whereby it will be seen that such hub 27 is guided between the convex wall of the casing-hub 22 and the concaved wall 32 of the inclined block 30. This member or block has its outer face 33 inclined at the desired angle to throw the drivers a sufficient distance outward, and on which inclined face the rear face of the actuating member 26 rests, the block 30 being so disposed that its great-



est thickness is preferably adjacent to the bottom of the looper, whereby the drivers will preferably have their greatest engagement with said looper at the under side thereof or at a point most remote from the throat of the throat-plate in a manner that will be readily understood. Thus it will be seen that such inclined member acts through the actuating member 26 to move the drivers inward and outward on the rotation of such member 26 with the casing 20 by the driving-shaft 7, which latter may be rotated by any desired means. It will also be seen that the angle of inclination of the block 30 regulates the throw of the drivers, which can be more or less than that herein shown, if desired.

The outer end of each driver, which is preferably beveled, engages successively in driver-sockets 35, disposed in the same position relatively to the looper as the drivers are disposed relatively to the casing, whereby said drivers will accurately and gradually enter and be withdrawn from said sockets in the operation of the machine.

In the construction shown in Fig. 10 the inclined block 30 is dispensed with and the actuating member 26 is stationary and constitutes a fixed resistance-actuator, it being formed with a wedge-shaped hub 40, fixedly secured, by means of suitable fastening devices, such as screws 4, to the bracket 6, and whereby the proper inclination of the working edge of said actuating member 26 is obtained. In this form of mechanism the drivers revolve with the casing and around the edge of the member 26, which is not provided with radial projections in this instance, and which member, as above stated, is stationary, whereby such drivers are moved inward and outward, owing to the inclination of the member 26, in a manner that will be readily understood without a more explicit description.

From the foregoing it will be seen that owing to the fact that the drivers have a transverse or lateral movement relatively to the casing and looper simultaneously with their revoluble movement with such casing they can engage the looper-sockets gradually and with greater accuracy than if they were fixedly secured to radial arms, and it will also be seen that by this particular construction of looper-driving means both the looper and the driving-shaft can have a common axis, and thus do away with the necessity of disposing either the axis of the looper or of the driver-shaft at an angle of inclination one to the other, as heretofore. It will also be seen that owing to the construction of the casing the various parts of the device can be quickly and easily assembled and disassembled and that owing to the construction of the inclined member 30 and the casing-member hub 22 the driver-actuating member 26 is positively held in position intermediate the same against vibratory movement, whereby the drivers will be actuated to engage and release the looper-sockets without shock or jar and with such a

high degree of precision that radial or diametrical movement of said looper will be prevented.

Having described my invention, I claim—

1. The combination, with a shuttle; of means for operating said shuttle, consisting of a driving-shaft; a case having a series of equidistantly-disposed chambers located near the periphery thereof and also having a convex portion; a series of grooved driving-pins mounted in said chambers; a plate provided with a concavo-convex hub and with a series of peripheral projections engaging the walls of the chambers and adapted to engage the driving-pins; and an inclined plate fixedly secured to the framing and provided with a concave seat to receive the hub of said disk.

2. The combination, with a rotary shuttle having driving-sockets, of a rotary support having its axis of rotation coincident with that of the shuttle; means for rotating said support; a circuit of shuttle-driving pins carried by, and disposed transversely to the plane of rotation of, the support, and having on their inner sides transverse recesses facing toward the axis of rotation of such support; a pin-reciprocating actuator in engagement with the walls of said recesses in the driving-pins and disposed in a plane at an inclination to the axis of rotation of the rotary support; and means for maintaining said actuator in said plane.

3. The combination, with a rotary shuttle having driving-sockets, of a rotary support having its axis of rotation coincident with that of the shuttle; means for rotating said support; a circuit of shuttle-driving pins carried by, and disposed transversely to the plane of rotation of, the support, and having on their inner sides transverse recesses facing toward the axis of rotation of such support; a rotary pin-reciprocating actuator in engagement with the walls of said recesses in the driving-pins, and rotatable in unison with, and in a plane at an inclination to the axis of rotation of, the rotary support; and means for maintaining said actuator in said plane.

4. The combination, with a rotary shuttle having driving-sockets, of a rotary support having its axis of rotation coincident with that of the shuttle and having a series of chambers transverse to its plane of rotation; means for rotating said support; shuttle-driving pins carried in said chambers and disposed in a circuit, and having on their inner sides transverse recesses facing toward the axis of rotation of said support; a pin-reciprocating actuator disposed in a plane at an inclination to the axis of rotation of the rotary support, and having radial projections in engagement with the end walls of the recesses in the driving-pins and with the side walls of the chambers in the support, to thereby rotate in unison with said support; and means for maintaining said actuator in said plane.

5. The combination, with a rotary shuttle



having driving-sockets, of a rotary casing having its axis of rotation coincident with that of the shuttle and having a series of chambers transverse to its plane of rotation; means  
5 for rotating said casing; shuttle-driving pins carried in said chambers and disposed in a circuit, and having on their inner sides transverse recesses facing toward the axis of rotation of such casing; a fixed member having  
10 a supporting-face inclined to the axis of rotation of the casing; and a pin-reciprocating actuator disposed in a plane at an inclination to such axis, and in engagement with the end walls of the recesses in the driving-pins, and  
15 between, and forming a universal joint with, the rotary casing and said fixed member.

6. In a sewing-machine, the combination, with framework, of a looper peripherally supported for rotation and having a series of driving-sockets, and driving mechanism comprising a driving-shaft journaled in said framework for rotation; a casing having an exteriorly-curved or convex hub and mounted on said shaft for rotation therewith and also hav-

ing a series of transversely-extending chambers; a driver-pin mounted in each of said chambers for sliding movement, each of said pins having a transverse slot communicating with a slot in the inner wall of its respective chamber; a member fixedly secured to said  
25 framework and having an inclined face and having a centrally-disposed bore or opening provided with a curved or concaved wall; an actuator provided with a series of projections extending through the slots of the chamber-  
30 walls and engaging in the slots of the driver-pins, said actuator also having a concavo-convex hub fitting intermediate the hub of the casing and the concaved wall of the inclined  
35 faced member, for rotation with said casing, to thereby actuate said drivers laterally or transversely of said casing toward and from the looper, to engage and disengage in the sockets thereof. 40

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