No. 685,633. Patented Oct. 29, 1901.

E. OLDFIELD.

SHEDDING MOTION FOR LOOMS.

(Application filed Jan. 22, 1900.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.

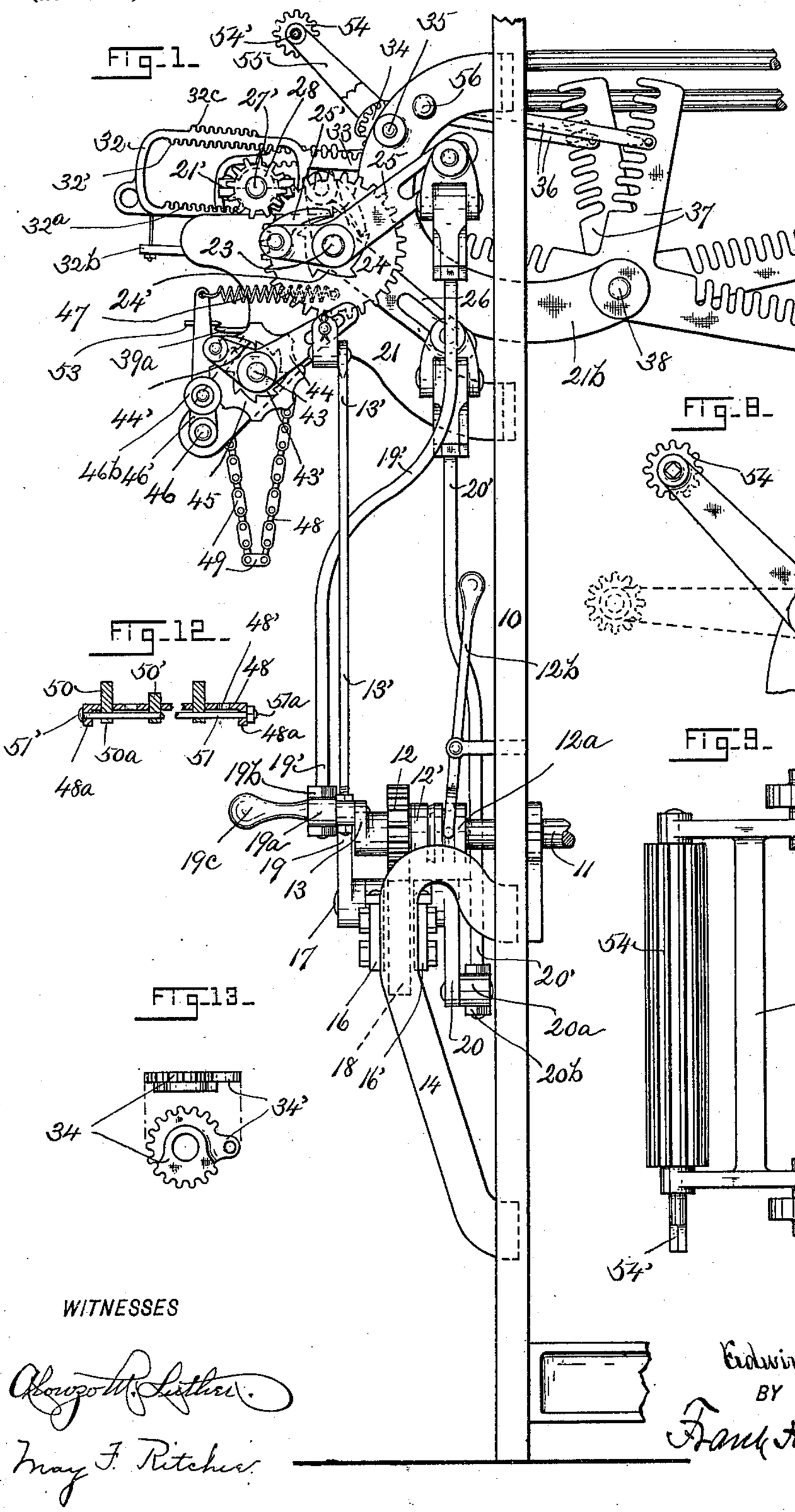


Fig. 12.

Fig. 13.

Fig. 8.

Fig. 9.

WITNESSES

Alonzo W. Litten.

May F. Ritchie.

INVENTOR,

Edwin Oldfield,

BY

Frank H. Allen,

ATTORNEY.

No. 685.633. Patented Oct. 29, 1901.

E. OLDFIELD.

SHEDDING MOTION FOR LOOMS.

(Application filed Jan. 22, 1900.)

(No Model.) 5 Sheets—Sheet 2.

Fig. 2.

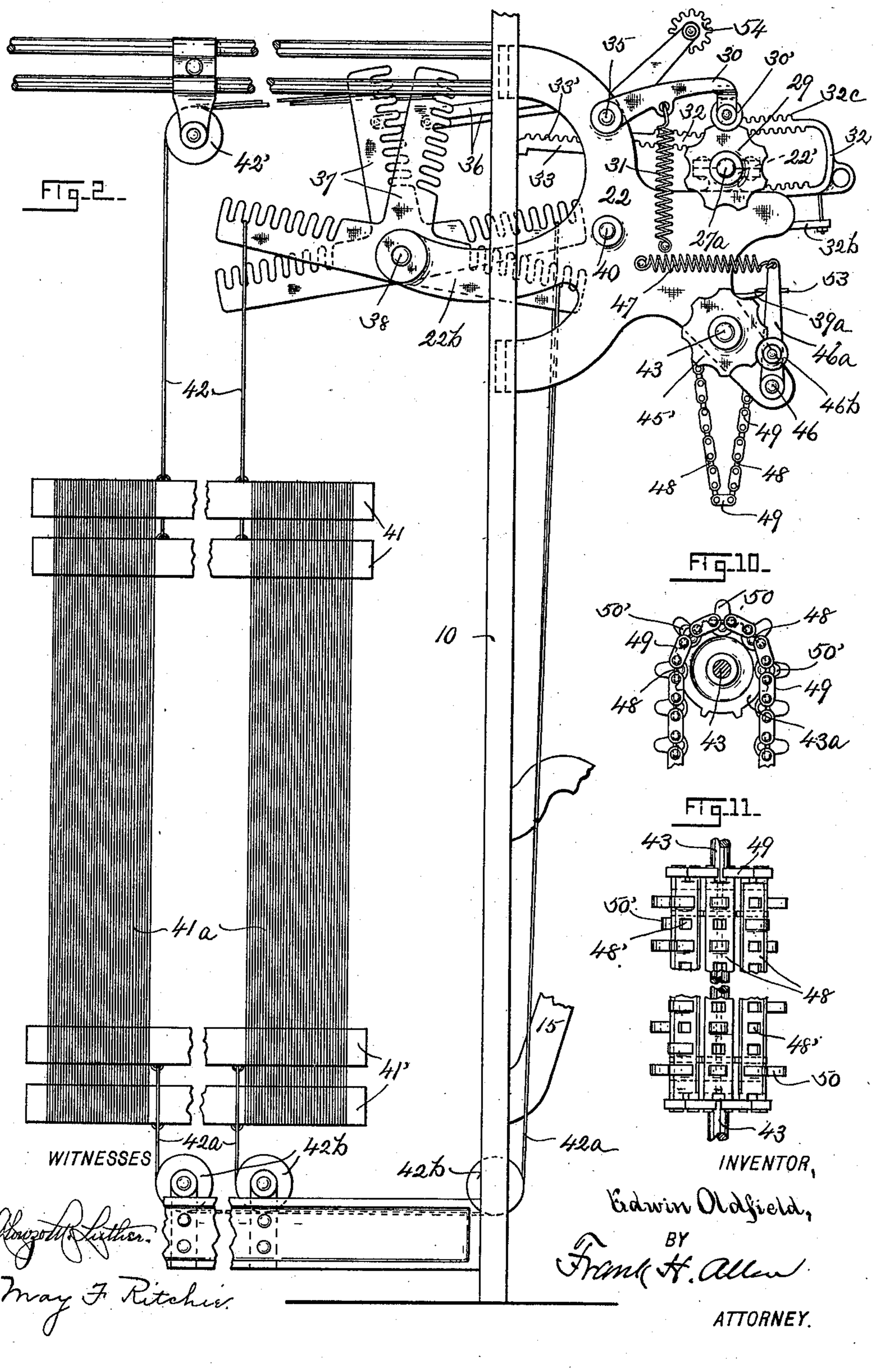


Fig. 10.

Fig. 11.

INVENTOR,
Edwin Oldfield,
BY
Frank H. Allen.
ATTORNEY.

No. 685,633. Patented Oct. 29, 1901.

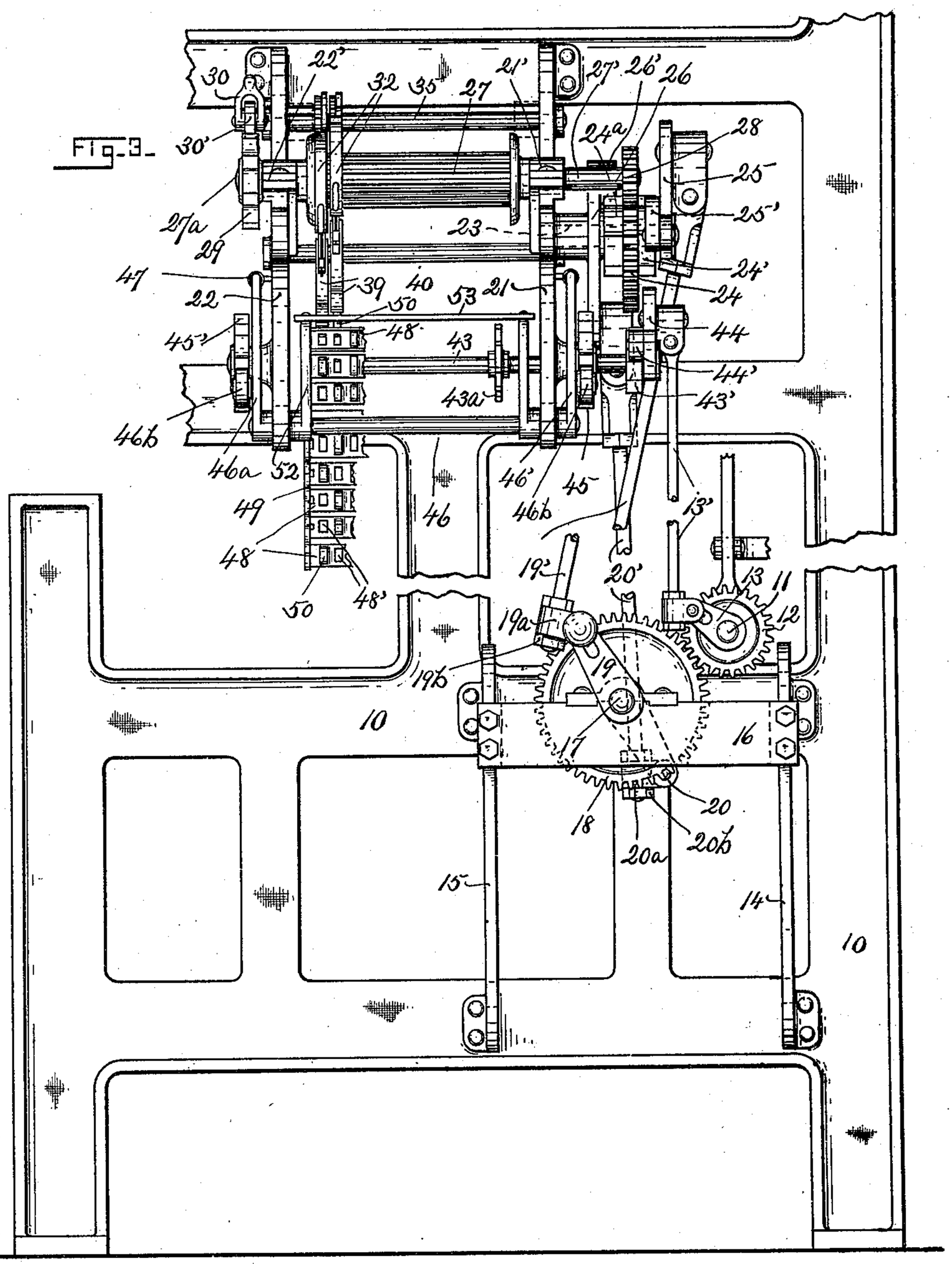
E. OLDFIELD.

SHEDDING MOTION FOR LOOMS.

(Application filed Jan. 22, 1900.)

(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



WITNESSES

Alonzo W. Litchfield.

May F. Ritchie.

INVENTOR,

Edwin Oldfield,

BY

Frank H. Allen

ATTORNEY,

No. 685,633. Patented Oct. 29, 1901.

E. OLDFIELD.

SHEDDING MOTION FOR LOOMS.

(Application filed Jan. 22, 1900.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 4.

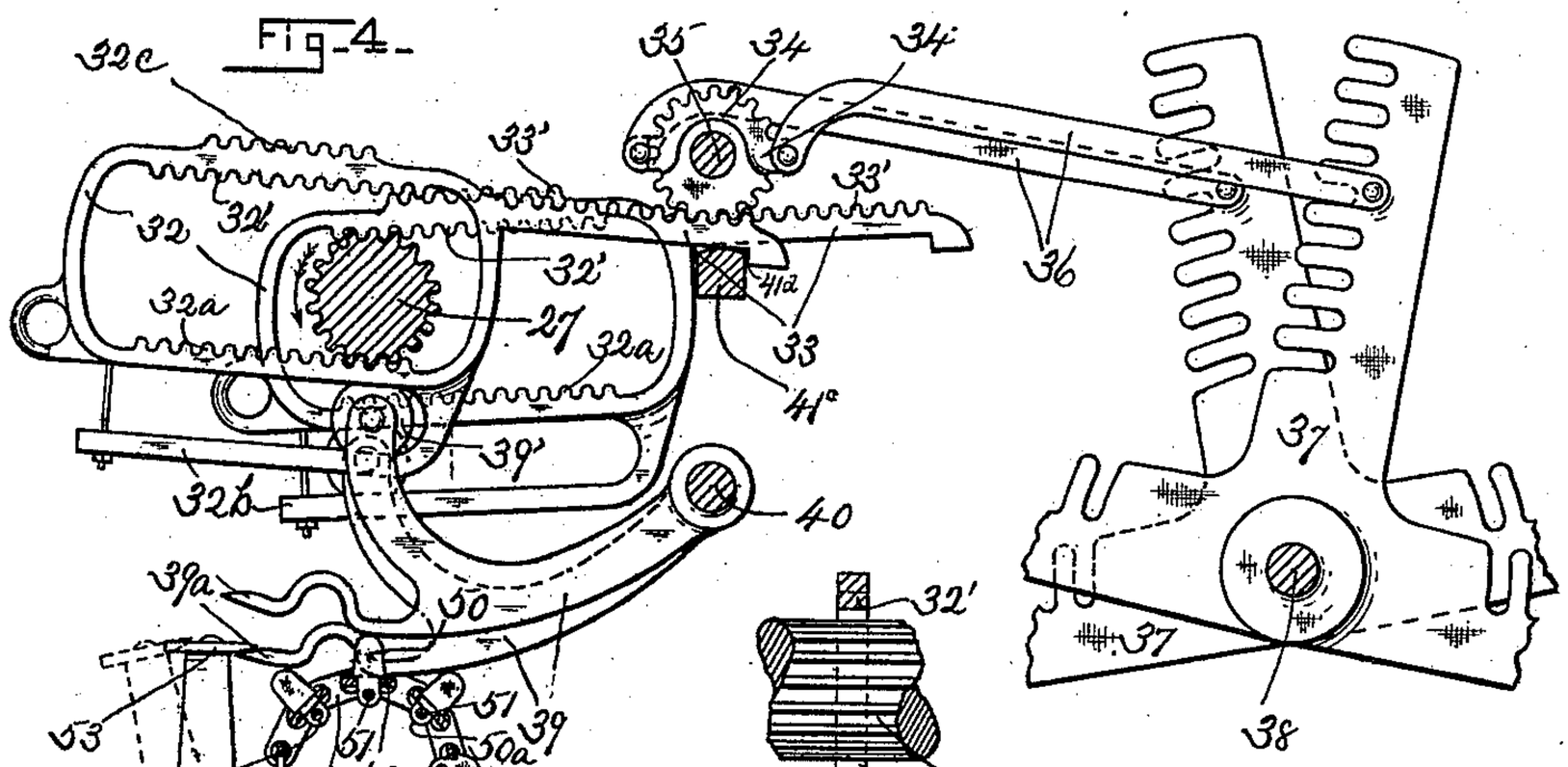


Fig. 6.

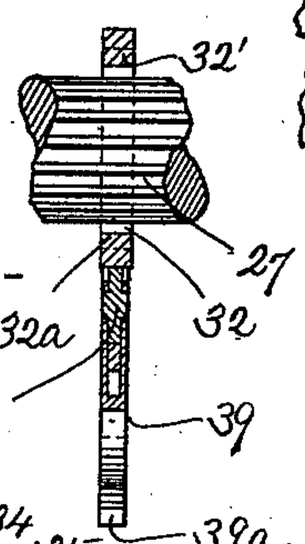


Fig. 7.

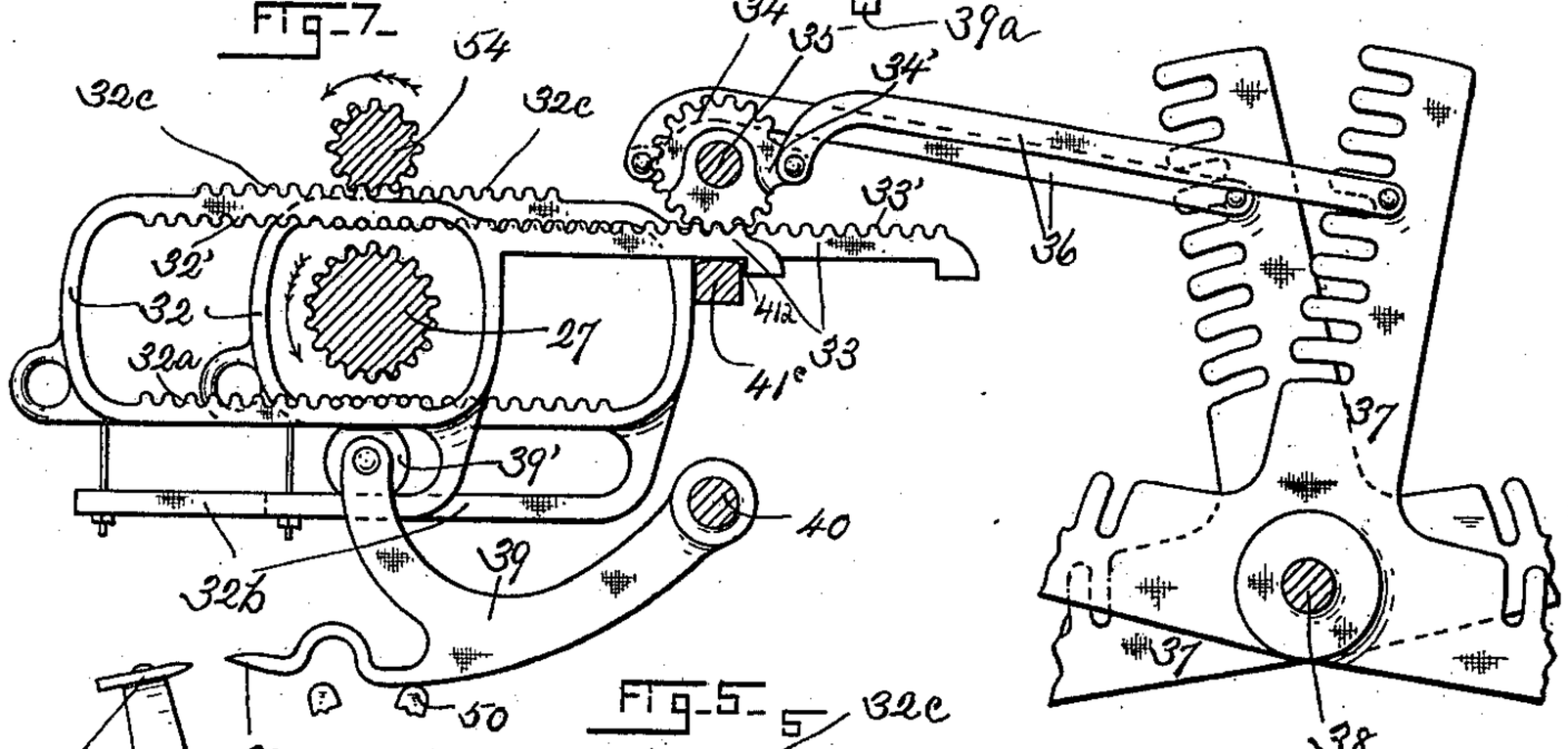
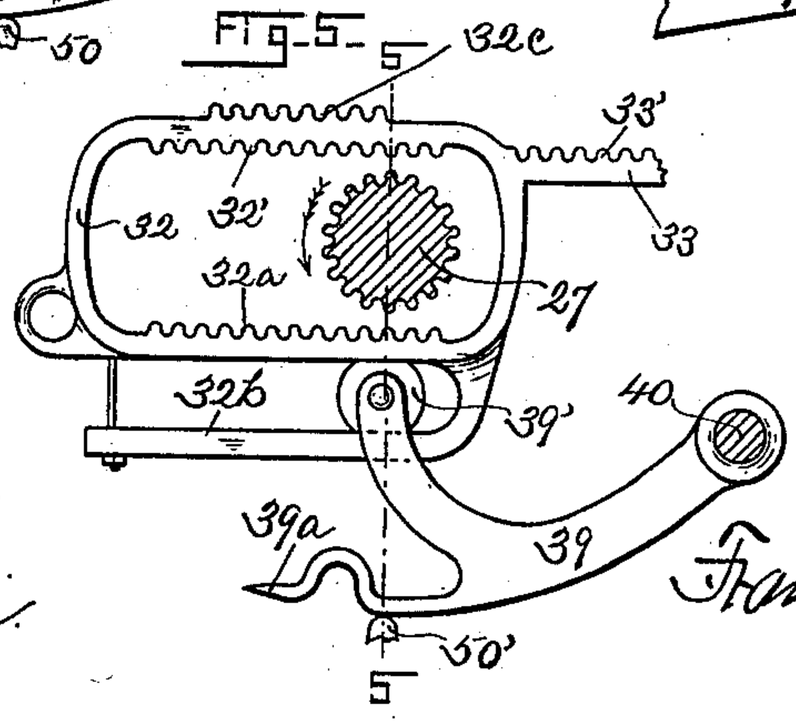


Fig. 5.



WITNESSES

Abbazoth. Luther.

May F. Ritchie.

INVENTOR,

Edwin Oldfield,

BY

Frank H. Allen

ATTORNEY.

No. 685,633. Patented Oct. 29, 1901.

E. OLDFIELD.

SHEDDING MOTION FOR LOOMS.

(Application filed Jan. 22, 1900.)

(No Model.) 5 Sheets—Sheet 5.

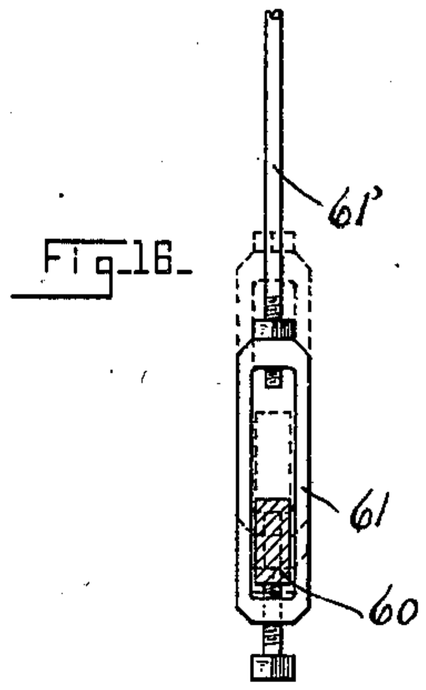


Fig. 16.

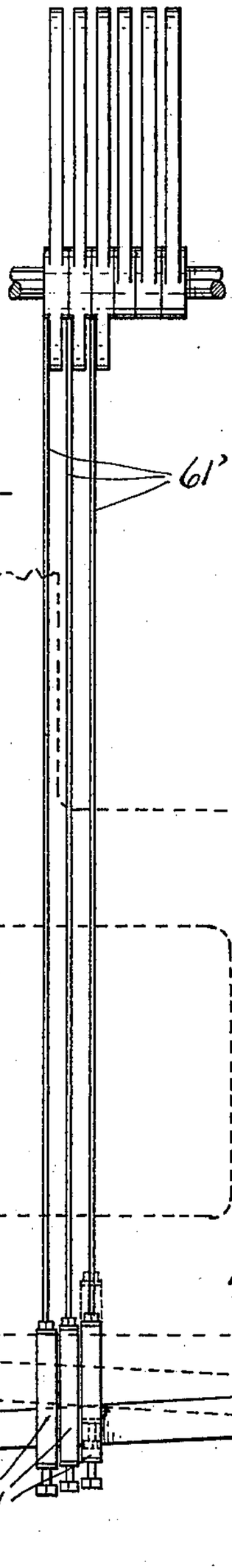


Fig. 14.

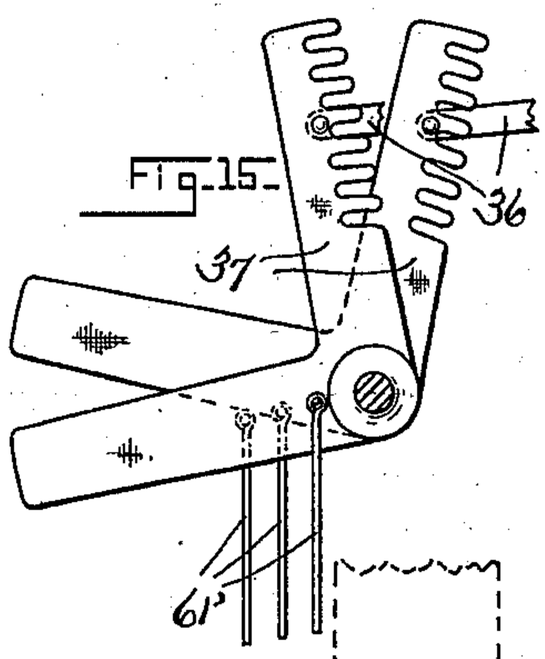


Fig. 15.

WITNESSES

Alonzo W. Luther.

May F. Ritchie.

INVENTOR,

Edwin Oldfield,

BY

Frank A. Allen

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWIN OLDFIELD, OF NORWICH, CONNECTICUT.

SHEDDING-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 685,633, dated October 29, 1901.

Application filed January 22, 1900. Serial No. 2,245. (No model.)

To all whom it may concern:

Be it known that I, EDWIN OLDFIELD, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Looms, of which the following is a full, clear, and exact description.

The object of this invention is to provide harness and drop-box controlling mechanism for looms which shall be superior in operation to corresponding mechanisms now in common use. My said mechanism is of simple and compact construction. It is positive in its action, thus practically avoiding any "skips" or "mispicks." The same may be readily "set up" as required by the design to be woven. It is readily controlled to regulate the speed of the heddle-frames regardless of the speed of the loom and may be readily disconnected to enable the same to be operated independently of the loom when it is desirable to "even" the harness or adjust the drop-box mechanism of said loom.

My newly-invented mechanism, briefly described, embodies means connecting the main shaft of the loom with a gear of wide face, termed a "cylinder-gear," which latter is mounted in suitable bearings and is actuated by said means to revolve with an intermittent motion. The cylinder-gear is inclosed by a series of frames, termed "rack-frames," extending at right angles to the length of said gear and each of which frames is provided with two racks adapted, respectively, to engage the said cylinder-gear at points thereon diametrically opposed. The rotation of the cylinder-gear serves to drive the rack-frames with reciprocating motion, such action being attained by bringing the said racks alternately into mesh with said gear, as hereinafter more fully described. The rack-frames bear an extension of rack form which meshes with a spur-gear, and by reason of the reciprocating travel of the frames the said spur-gears are caused to revolve reciprocally, the extent of such movement being approximately one-half a complete revolution. The spur-gears just mentioned are each connected by a link with a jack-lever, which latter, through the said links, is rocked by the rotary reciprocating movement of the said spur-gears. Motion is imparted by the jack-levers to the heddle-frames and drop-box mechanism by means of wires or the like connecting the said jack-levers to the heddle-frames and the drop-box mechanism.

The rack-frames above referred to are engaged by certain mechanism which I term "vibrator-frames," which latter are controlled by means of a device commonly called the "pattern-chain." The said pattern-chain consists of a number of metallic strips or sections extending parallel with each other and with the cylinder-gear and linked together, so they may render over sprockets located on a shaft extending parallel with the said cylinder-gear in order that the sections of chain may be presented successively to the vibrator-frames. The said sections of the pattern-chain are adapted to receive studs therein, the presence or the omission of which studs results in so actuating the vibrator-frames and the rack-frames controlled thereby as to cause the racks of the rack-frames to mesh with the cylinder-gear, as already described, or be held out of contact with said cylinder-gear.

With a pattern-chain of the above construction the studs thereof may be readily arranged to control the movements of the heddle-frames and drop-box mechanism to meet the demands of the pattern to be woven.

To assist in explaining my invention, I have provided the accompanying five sheets of drawings, in which Figures 1, 2, 3, and 14 are on a somewhat reduced scale as compared with the remaining figures of the drawings, which said drawings serve to illustrate my newly-invented harness and drop-box mechanism, as follows:

Fig. 1 is a rear side elevation of that end of the loom to which my newly-invented mechanism is applied and shows the major part of said mechanism mounted thereon. Fig. 2 is a view similar to Fig. 1, but taken at the front side of the loom and showing certain features not shown in said Fig. 1. Fig. 3 is an end elevation of the loom with my said mechanism in position thereon. Fig. 4 shows the rack-frames and parts immediately related thereto, principally in elevation, and illustrates the means by which the said frames are actuated to bring the racks into

engagement with the cylinder-gear and also the manner in which the reciprocating movement of said frames serves to effect the rocking of the said levers. Fig. 5 is an elevation of a portion of one of the rack-frames, showing the same in its neutral position—*i. e.*, with both of its racks out of mesh with the cylinder-gear. Fig. 6 is a cross-sectional view taken on the line 5 5 of Fig. 5. Fig. 7 is a view similar to Fig. 4, but serving also to illustrate a certain means for manipulating the rack-frames independently of the cylinder-gears. Figs. 8 and 9 illustrate, in elevation and plan views, respectively, the said means for operating the rack-frames independently of the cylinder-gear. Figs. 10 and 11 are respectively end elevation and plan views of the pattern-chain. Fig. 12 is a longitudinal sectional view of one of the sections or strips of the said pattern-chain and of the studs secured thereto. Fig. 13 embraces edge and side views of the spur-gear driven by the rack extension of the rack-frames. Fig. 14 shows in dotted lines the end elevation of a loom having my newly-invented mechanism applied to the drop-box mechanism thereof. Fig. 15 is an elevation of the jack-levers of Fig. 14 and shows the manner in which connection is made therefrom to operate the drop-box mechanism. Fig. 16 shows in elevation, detached, an element in the connection between the jack-levers and a lever forming a portion of the drop-box mechanism.

Referring to the drawings, the number 10 denotes the end frame of a loom, and 11 its main shaft. The shaft 11 bears outside the frame 10 a spur-gear 12, having secured to its hub a crank-arm 13, to which is adjustably secured the lower end of an upwardly-extending rod 13′, connecting with certain mechanism whereby the feeding of the pattern-chain is effected.

Secured to the outer face of the lower portion of the end frame 10 is a pair of small frames 14 15, to which latter there are secured two plates 16 16′, extending parallel with each other and with the end frame 10. The plates 16 16′ are provided on their upper edge, midway their length, with bearings for the reception of a short shaft 17, upon which is mounted (between the plates 16 16′) a spur-gear 18, which gear is twice the size of the gear 12 and meshes with and is driven by the latter. The shaft 17 is provided at opposite ends with a crank-arm (similar to the crank-arm 12) and denoted, respectively, by the numbers 19 20. These crank-arms 19 20 have adjustably secured thereto upwardly-extending rods 19′ 20′, that connect with certain mechanism whereby the already-mentioned intermittent rotary motion of the cylinder-gear is attained.

Somewhat above the pair of small frames 14 15 there is secured at the proper point on the outer face of the end frame 10 a pair of frames 21 22, which serve to support the major portion of my newly-invented mechanism.

Projecting from the outer face of the frame 21 is a stud 23, upon which there is mounted a spur-gear 24, bearing upon its opposite faces ratchet-disks 24′ 24ª, that are concentric with the axial support of the gear 24. Mounted upon the stud 23, adjacent to the ratchet 24′, is an angle-lever 25, and adjacent to the ratchet 24ª is a similar angle-lever 26, each of the said angle-levers 25 26 having secured to its shorter arm a pawl 25′ 26′, adapted to engage the ratchets 24′ 24ª, and to the longer arms of said levers the upper ends of the rods 19′ 20′, above mentioned, are respectively secured. Upon the rotation of the main shaft 11 motion is imparted through the gear 12 to the gear 18 and to the arms 19 20, secured to the shaft 17 of the last-named gear, and said arms (through their link connections 19′ 20′) serve to rock the angle-levers 25 26, mounted on the stud 23. The rocking of the angle-levers 25 26 is so timed that the pawls carried thereby alternately engage their respective ratchets 24′ 24ª to effect the rotation of the latter and the gear 24, to which they are secured—that is to say, when one of the angle-levers is rocking to cause its pawl to move forward, and thus revolve its engaging ratchet, the companion angle-lever is rocking in the opposite direction and the pawl carried thereby is moved backward and caused to ride idly over the teeth of its ratchet.

The mechanism just described effects the revolving of the gear 24 with an intermittent motion, and the interval between its movements is made sufficiently long to permit of the operation of certain other mechanism hereinafter described. To provide a considerable interval of rest between the movements of the gear 24, the levers 25 and 26 when rocked backward are carried somewhat farther than is absolutely necessary to permit the pawls to drop in the rear of the respective teeth which they are to engage, thus resulting in a certain amount of lost motion or backlash. When the gear 24 is in motion, the pawl which is serving to revolve the same completes its work substantially simultaneously with the dropping of the backwardly-moving pawl behind the tooth which the latter is to engage upon its next forward movement, and it will therefore be seen that any continued backward travel of the last-named pawl from said tooth and its return movement thereto will constitute the said lost motion, during which time the gear 24 will be at rest. To regulate the length of the interval of rest, the ends of the connecting-rods 19′ 20′ adjacent to the crank-arms 19 and 20 are not secured directly to said arms, but are threaded and enter, respectively, collars 19ª 20ª, pivotally secured to said arms, through which collars said threaded ends pass and are secured by set-nuts 19ᵇ 20ᵇ. By means of the said set-nuts the length of the connecting-rods may be varied slightly to determine the starting and stopping points of the angle-le-

vers 25 26. To still further control the movement of the said levers, the ends of the connecting-rods 19′ 20′ are adjustably secured to their respective levers, as shown, thus making it possible to regulate the throw of the latter.

The cylinder-gear already referred to is denoted by the reference-number 27, is located between the frames 21 22, and is mounted upon a shaft or is provided with journals 27′ 27^a, extending from its opposite ends and resting in bearings 21′ 22′, provided in the frames 21 22. The journal 27′ bears upon its outer end a pinion-gear 28, which meshes with the gear 24, and upon the rotary movements of the latter the said pinion-gear is revolved substantially a half-revolution, resulting in correspondingly revolving the cylinder-gear 27. The journal 27^a bears upon its outer end a notched wheel 29, whose notches are engaged by a roll hung in the free end of an arm 30, pivotally secured to the outer face of the frame 22. Midway its length the lever 30 has secured thereto one end of a spring 31, whose opposite end is secured to the frame 22, which spring serves to draw the lever 30 downward to hold the roll carried in its free end and denoted by the number 30′ in engagement with the uppermost notch of the notched wheel 29 to prevent the accidental rotation of the latter and of the cylinder-gear during the latter's intervals of rest.

The reference-number 32 denotes as a whole the rack-frame, already mentioned, one of which frames being provided for each heddle-frame in the loom and also as many additional as may be necessary to operate the drop-box mechanism. The main portions of the rack-frames are substantially rectangular in outline and inclose the cylinder-gear 27, as best shown on Sheet 4 of the drawings. The confronting faces of the upper and lower sides of the rectangular portion of the rack-frames are provided with racks 32′ 32^a, which are adapted to engage the cylinder-gear at the opposite sides thereof, as already mentioned. The extension of the rack-frames is denoted by the number 33 and the toothed rack thereof by the number 33′, which latter meshes with the spur-gear 34, loosely mounted upon a shaft 35, having bearings in the frames 21 22.

The reference-number 36 denotes a link serving to connect each spur-gear 34 with an upwardly-extending arm of a jack-lever 37. These jack-levers are loosely mounted upon a rod 38, supported by and between extensions 21^b 22^b of the frames 21 and 22.

The forward end of the rack-frame 32 or the end adjacent the cylinder-gear is supported by means of a vibrator-frame 39, which consists of an arm hung upon a rod 40, supported by and between the frames 21 22 and bearing at its end a block 39′, which latter is movably located between the lower side of the rack-frame 32 and a parallel extension 32^b of the said frame.

The vibrator-frame 39 bears an extension 39^a, which is adapted to be engaged by the pattern-chain (hereinafter described in detail) to effect the rocking of the said vibrator-frame in order to cause the latter to raise or lower the rack-frame 32, so as to bring the upper rack 32′ or the lower rack 32^a into mesh with the cylinder-gear, as may be desirable. The rack extension 33 of the rack-frame 32 is supported by and capable of movement upon a rod 41^c, extending from frame 21 to the frame 22. The free end of the rack-frame extension is formed on its under side with an angular offset 41^d, which operates, together with the said rod 41^c, to limit the forward movement of the rack-frame, and thus insure the proper meshing of the rack-teeth with the teeth of the gear 29 whenever the racks are moved into and out of operative engagement with said gear.

Referring now to Fig. 4, it will be seen that two of the rack-frames 32 and connected parts are shown, the nearer of which is in its raised and forward position, with the lower rack 32^a in mesh with the cylinder-gear 27 and at the under side of the latter, while the companion (farther) rack-frame 32 of Fig. 4 is in its lowered and backward position, with its upper rack 32′ in mesh with the cylinder-gear 27, at the upper side of the latter. It will now be seen that if the cylinder-gear 27 be partially revolved in the direction of the arrow adjacent thereto such action of the gear will cause the nearer rack-frame to travel to its rearward position, while the companion or farther rack will be caused to travel to its forward position, the extent of revolution of the cylinder-gear 27 being sufficient to move the racks, as stated. When the rack-frames travel in the manner just mentioned, they ride upon the blocks 39′ of the vibrator-frames 39, engaging the bottom side of said frames and the parallel arm 32^b thereof. The block 39′ being confined between the rack 32^a and the parallel arm 32^b causes the rack-frame to follow the movements of the vibrator-arm 39 positively instead of depending upon gravity alone to lower the said rack-frame. When the rack-frames have reached their respective positions just mentioned—*i. e.*, the nearer rack having traveled rearward and the farther rack forward—the pattern-chain is free to act to lower the vibrator-frame 39 of the nearer rack-frame, and correspondingly lower said frame to bring its upper rack into engagement with the cylinder-gear 27, while the vibrator-frame of the farther rack may be raised by said pattern-chain to lift the farther rack-frame and carry its lower rack 32^a into mesh with the cylinder-gear. Upon the completion of the described movements it will be understood that the nearer rack-frame 32 and its companion (farther) frame will have changed places and that the latter is now in

its forward position and in readiness to travel rearward when the cylinder-gear 27 is again partially revolved, while the nearer rack will be in its rearward position in readiness to travel forward upon the next partial revolution of the cylinder-gear.

Assuming that the cylinder-gear 27 is arranged to revolve in the direction of the arrow adjacent thereto, it will be seen that by raising a rack-frame upon the completion of its forward movement and lowering the same upon the completion of its rearward movement, so as to disengage the rack 32′ from meshing contact with the cylinder-gear 27 and to carry the rack 32ª into mesh with said cylinder-gear, (or vice versa,) the rack-frame will be caused to travel with a reciprocating motion.

The racks 33′ of the rack-frame extensions 33 are at all times in mesh with their respective spur-gears 34, and upon the reciprocating travel of the rack-frames 32 the said spur-gears 34 are actuated to revolve alternately in opposite directions, the extent of such revolution being practically one-half a complete revolution. When the nearer rack-frame 32 of Fig. 4 travels rearward, as already described, the rack 33′ of its extension 33 will serve to so revolve the spur-gear 34, meshing therewith, as to carry the link 36 (the nearer link) from the position shown to the position of the rear link 36, and it will be understood that during such movement the said rear link 36 will have been transferred to the position of the nearer link. The opposite ends of the links 36 are connected to the jack-levers 37 to effect the rocking of said levers, as will be readily understood.

The gear 34 is preferably provided with a radial extension 34′, to which the link 36 is secured, and also a portion of one face of said gear is preferably cut away to reduce the thickness thereof, as shown in Fig. 13, thus permitting the said gears to be placed close together and allowing the link end to be received between them.

As already explained, motion is imparted from the jack-levers 37 to actuate the heddle-frames and also to actuate the hereinafter-described drop-box mechanism of the loom.

Referring now to Fig. 2, it will be seen that the heddle-frames are of the usual construction—that is to say, they consist of the upper and lower bars 41 41′, connected by the heddles 41ª, that receive and support the warp in the usual manner. Leading from the upper bar 41 of the heddle-frame are cords or wires 42, one of which leads over a pulley 42′ and thence to the upwardly-extending arm of the jack-lever, and the other leads to an adjacent arm of said lever, extending at right angles to the said upwardly-extending arm. Secured to the lower bar 41′ of the heddle-frame are cords or wires 42ª, similar to those connected to the bar 41′, that lead downward therefrom around pulleys 42ᵇ and thence upward to an arm of the jack-levers. The cords 42′ and 42ª are secured to their respective jack-lever arms at a uniform distance from the point on which the lever rocks, and it will therefore be readily seen that upon the rocking of the levers the complete heddle-frame will be caused to rise and fall in the usual manner. Two heddle-frames only are shown in the drawings; but it will be obvious that any desired number (within the limits of the cylinder-gear 27) may be provided, the operating mechanism of such additional heddle-frames being like that just described.

In connection with the described manner of moving the heddle-frames by means of the rocking jack-levers it should be understood that the extent of movement of the latter may be readily controlled by varying the distance the cords 42′ 42ª are secured from the rocking center of the jack-levers. To still further control the movement of the heddle-frames, the link 36 may be adjustably secured to the jack-levers, if so desired, in order that the throw of said levers may be varied.

Describing now the pattern-chain and mechanism immediately related thereto, the reference-number 43 denotes a shaft having suitable bearings in the frames 21 22 and extending parallel with the cylinder-gear 27. The shaft 43 bears thereon, outside the frame 21, a fixed ratchet 43′, and also adjacent thereto a loosely-mounted angle-lever 44, one arm of which bears a pawl 44′, adapted to engage the ratchet 43′, the companion arm being adjustably secured to the upper end of the rod 13′, whose lower end is secured to the arm 13. Upon the rotation of the arm 13 the rod 13′, connecting said arm with the angle-lever 44, effects the rocking of said lever and causes the pawl 44′, carried by the lever and engaging the ratchet 43′, to revolve the latter with an intermittent or step-by-step motion. The intermittently-revolving shaft 43 serves to drive the pattern-chain, which latter rides over sprockets 43ª, and in order to prevent the accidental movement of the shaft and sprocket-chain between the said intermittent movements the following-described locking mechanism is provided: Located on the shaft 43 just outside the frame 21 is a notched wheel 45, and at the end of said shaft adjacent the frame 22 and outside said frame there is located a similar notched wheel 45′. Extending parallel with the shaft 43 and supported in suitable bearings in the frames 21 22 is a rock-shaft 46, bearing on its opposite ends, outside the said frames, arms 46′ 46ª, each of which latter bears a roll 46ᵇ midway its length, that is adapted to engage the notches of the wheels 45 45′, and in order to hold the roll and notches in close contact springs 47 are provided, whose opposite ends are secured, respectively, to the frames 21 22 and to the upper ends of the arms 46′ 46ª.

When the chain-driving mechanism is at rest, the springs 47 act to hold the rolls 46ᵇ in close contact with the notches of wheels 45

45′; but upon the rotation of said wheels the arms 46′ 46ª are forced outward against the resisting force of their respective springs 47, which latter again act to cause the rolls 46ᵇ to enter the next notch of the wheels 45 45′ whenever the said notches come coincident with the roll.

The metallic strips or plates, forming an essential feature of the pattern-chain, are denoted by the reference-number 48. These strips extend parallel with each other and are hinged together at their ends by means of links 49, and in the space between the adjacent edges of the strips the teeth of the sprockets 43ª are received, as clearly shown in Fig. 10. The strips 48 are each provided with a row of perforations 48′, each of which latter when the chain is in position is in vertical alinement with a vibrator-frame 39 or with the plane in which said frame is located. The studs, which are mounted upon the strips 48, are of two lengths, the longer of which is denoted by the reference-number 50 and the shorter by the number 50′. These studs are provided with a portion 50ª, which is adapted to be passed through the holes 48′ of the strip 48, and the said stud portion 50ª is perforated to receive a rod 51, that lies beneath the strip 48 and serves to hold the studs in position, as is best shown in Figs. 4 and 12.

To hold the rod 51 in place, the strip 48 is provided at each end with lugs 48ª, through which the said rod is passed, and in order to prevent the displacement of the rod it may be provided with a head 51′ at one end and a nut 51ª at the opposite end. From the description just given and by reference to Fig. 12 it will be seen that upon the withdrawal of the rod 51 the strip 48 may receive the studs 50 50′, which latter may then be arranged thereon in any desired order, after which the retaining-rod 51 may be replaced.

The studs 50 50′ of the plates 48 are adapted to engage the under side of an extension 39ª of the vibrator-frames 39, and whenever a plate reaches the highest point in its revolution (see Fig. 4) one of the studs 50 serves to elevate the rack-frame 32 sufficiently to carry its upper rack 32′ out of and its lower rack into engagement with the cylinder-gear 27, while the shorter studs 50′ serve to raise the coacting rack-frame only sufficiently to hold both of its racks out of mesh with the cylinder-gear 27, as will be understood by reference to Fig. 5. Upon the forward travel of the pattern-chain the studs move from beneath the vibrator-frames, which they respectively engage, and the said rack-frames drop by gravity to their lower positions.

The shaft 43, revolving with a step-by-step motion, causes the pattern-chain to travel intermittently, and thus each plate of the chain will present its studs 50 50′ in turn to engage the vibrator-frames 39. It will therefore be seen that by properly "setting up" the long and short studs of the pattern-chain the movement of the vibrator-frames can be positively controlled as well as the movement of the rack-frames 32, connected therewith, the described movements of the vibrator-frames resulting in causing the rack-frames to travel with a reciprocating motion or to remain stationary, as described.

The jack-levers 37, which are to actuate the drop-box mechanism, may be operated by the same chain that operates the levers controlling the heddle-frames, or a separate chain may be provided for said drop-box mechanism, which latter chain may be mounted upon the shaft 43 with the main portion of the pattern-chain and travel therewith. It is sometimes desirable to provide a double system of pattern-chains, as just mentioned, for the reason that it is often necessary to provide a pattern-chain of considerable length in order to properly control the heddle-frames when weaving a pattern of any intricacy, while on the other hand the drop-box mechanism is limited to a very few movements, and thus when a separate chain is provided therefor the constant repetition necessary to produce such movements, as well as the labor connected in making up the chain, is avoided.

To guard against any possibility of the rack-frames 32 riding upward and the racks 32′ becoming disengaged from meshing contact with the cylinder-gear 27 when the rack-frames are in their lower position, I have provided the following-described mechanism: Mounted upon the rock-shaft 46 adjacent the inner faces, respectively, of the frames 21 22 are upwardly-extending arms 52, whose upper ends are connected by a plate 53, extending parallel with the shaft 46 and nearly from frame 21 to the frame 22. The arms 52 are fixedly secured to the shaft 46 and rock with the latter, resulting in correspondingly moving the plate 53. When the rolls 46ᵇ on the arms 46′ 46ª are in engagement with their respective notched wheels 45 45′, the arms 52, mounted upon the shaft 46, are in their forward position, and so is the plate 53, carried thereby. When the plate 53 is in the position just mentioned, its edge adjacent the vibrator-frame 39 is adapted to engage and overlap somewhat the ends of the extensions 39ª of those vibrator-frames 39 that are in their lower position, and thus serve to prevent said frames and the rack-frames 32, controlled thereby, from riding upward. (See Fig. 4.) Upon the rotation of the shaft 43 in the manner already explained the notched wheels 45 45′ force outward the rolls 46ᵇ, resulting in rocking the arms 46′ 46ª, the shaft 46, and the arms 52, having the plate 53 secured thereto, and carrying said plate rearward, Fig. 7, to allow any of the vibrator-frames 39 to be raised that may have been overlapped by the said plate 53 and to permit other of the said frames to assume their lower position. Upon the sufficient rotation of the shaft 42 to bring the next succeeding notch of the wheels 45 45′ into coincidence with the rolls 46ᵇ the springs 47 act to return

the arms 46′ 46ª, on which said rolls are mounted, and the shaft 46, controlled thereby, into their forward position, thus again bringing the plate 53 into engagement with those vibrator-frames that may be in their lower position.

It should be understood that the various mechanisms are so timed that the above-described travel of the pattern-chain and parts immediately related thereto occurs while the mechanism for actuating the cylinder-gear 27 is at rest, the said movements of the pattern-chain mechanism taking place during the occurrence of the lost motion, above described, of the cylinder-gear-driving mechanism.

Referring again to the mechanism for driving the cylinder-gear 27, it will be remembered and will be seen from the drawings that the upper ends of the connecting-rods 19′ 20′ are adjustably secured to the angle-levers 25 26 and that the lower ends are likewise adjustably secured to the arms 19 20. It will therefore be readily understood that by adjusting the lower ends of the rods 19′ 20′ toward or away from the shaft 17 the said rods may be caused to act either with a fast or slow motion, while the connection at the upper end of said rods may be adjusted to regulate the throw of said levers regardless of the speed at which they travel. By means of the adjustable feature just mentioned the cylinder-gear and the heddle-frames may be driven either with a rapid or slow motion, which feature is very valuable, it being desirable to move said frames rapidly in weaving certain styles of goods, while a slow movement is desirable for other styles.

To make it possible to operate my newly-invented mechanism independently of the loom proper, the gear 12 instead of being fixedly secured to the main shaft 11 is secured to the loose section 12′ of a clutch mounted upon the shaft 11, the companion section 12ª of the clutch being splined to the said shaft. The splined clutch-section is controlled by a lever 12ᵇ, which is pivotally secured to the frame 10 and is adapted to be operated in the usual manner to slide the splined clutch-section into or out of engagement with the loose section 12ª, so as to lock the gear 12 to or release it from the main shaft 11. The arm 19 of the gear 18 is provided with a handle 19ᶜ, by means of which the said arm may be rotated by hand and the mechanism driven independently of the loom proper upon the disconnecting of said mechanism from the main shaft.

It is often desirable to raise the heddle-frames that may be in their lower position to their elevated position in order that the warp-threads may be readily reached whenever it may be necessary for any cause to do so, thus bringing the several heddle-frames to a common elevated position, in which case the jack-levers will have also assumed a common position. To enable the heddle-frames to be easily manipulated in the manner stated, I have provided on the outer face of the upper side of each rack-frame 32 a short rack 32ᶜ, which is adapted to receive and be driven by means of a cylinder-gear 54, which latter is adapted to be rocked into and out of engagement with the racks 32ᶜ. The cylinder-gear 54 corresponds in length and is parallel with the cylinder-gear 27 and is supported in bearings in a frame 55, which latter is hinged upon the shaft 35 adjacent the frames 21 22. The frame 55 has formed thereon an arm 55′, which lies adjacent to the frame 21 and is adapted to be engaged by the inner end of a pin 56, removably located in the said frame 21. The frame 55 is adapted to be rocked upward on the shaft 35 to hold the cylinder-gear 54 in an elevated position when not in use, and said frame and gear are retained in said elevated position by means of the pin 56, which is inserted in the frame 21, the inner end thereof engaging the upper side of the arm 53′ of said frame, as shown in Figs. 8 and 9.

When it is desired to raise the heddle-frames that may be in their lower position, my newly-invented mechanism is operated by hand independently of the loom proper and motion imparted to the pattern-chain to bring the several vibrator-frames 39 and the rack-frames 32, controlled thereby, into their neutral position relative to the cylinder-gear 27, as shown in Fig. 7. The pin 56, supporting the frame 55, carrying the cylinder-gear 54, is removed and the frame 55 is rocked downward until the cylinder-gear 54 is in mesh with the racks 32ᶜ of those rack-frames 32 that are in the forward position. The pin 56 is now again inserted in the frame 21, when the end of said pin engages the arm 55′ of the frame 55 at the under side of said arm, resulting in holding the frame 55 and the cylinder-gear 54 in the just-mentioned lower position.

The shaft of the cylinder-gear 54 projects through its bearings in the frame 55 and the end thereof is squared, as at 54′, to receive a handle or crank, by means of which the gear 54 is rotated. Upon the rotation of the cylinder-gear 54 in the direction of the arrow of Fig. 7 it will act to drive the said rack-frames to their rearward position and leave undisturbed those frames already in their rearward position, as the rack-frames 32ᶜ thereof are just beyond meshing contact with the cylinder-gear 54. The jack-levers 37 will thus have been rocked to raise the heddle-frames, and by reversing the described movement of the crank the heddle-frames may be lowered again to their original positions.

Describing now the manner in which the rocking of the jack-levers 37 is utilized to operate the drop-box mechanism, (shown on sheet 5 of the drawings,) the batten of the loom is denoted by the reference-number 57 and is supported by the arms 57′ to swing from the rod 58 in the usual manner. The reference-number 59 denotes the box in which the shuttles are located, one above the other,

which said box is designed to slide through the batten and is supported by a rod 59′, whose lower end is connected by a link 59ª with the end of a lever 60, pivotally secured to the loom-frame 10. The box 59, as shown, is designed to carry four shuttles, and it will be readily seen that by properly rocking the lever 60 to raise and lower the shuttle-box any one of the several shuttles may be carried to the proper elevation to register with the raceway of the batten.

To bring all of the shuttles into operative position, it will be seen that it will be necessary to provide for one less movement of the shuttle-box than there are shuttles, as the upper shuttle in its normal position is in such operative position. When four shuttles are provided, as in the drawings, it is therefore necessary to provide for three different movements of the shuttle-box, which said movements are effected as follows: The lever 60 is received in straps 61, each of which is connected by a wire 61′ with a jack-lever 37, the said wires being secured to their respective jack-levers at such a distance from its rocking center as to effect the lifting of its strap and the lever 60 sufficiently to bring one of the shuttles of the box 59 into operative position. To operate the drop mechanism at the opposite end of the loom, wires or cords may be led from the jack-levers 37 over suitable pulleys and connected with the lever 60, as shown.

Having thus described my invention, I claim—

1. In combination, a cylinder-gear and duplex racks, as set forth, for imparting motion to the harness of a loom, means for revolving said cylinder-gear with a step-by-step movement including gears 28 24 and duplex ratchet-and-pawl mechanism, means for moving the said racks out of mesh with the said cylinder-gear and for supporting them inoperable, substantially as specified.

2. In combination, an intermittently-rotating cylinder-gear, racks 32′ 32ª located on opposite sides of said cylinder-gear, means for holding both of said racks out of engagement with said cylinder-gear, a supplemental rack 32ᶜ and a pinion-gear adapted to be moved into and out of engagement with said rack 32ᶜ.

3. In combination, a pattern-chain shaft 43 having a notched wheel 45′ mounted thereon, a vibrator-arm 39, a stop-arm 52 adapted to engage the said vibrator-arm as set forth, a roll 46ᵇ carried by the arm 52 and a spring for holding the said roll in engagement with the said notched disk; the arrangement of the described elements being such that the rotation of shaft 43 serves to simultaneously feed the pattern-chain and operate the stop-arm 52.

4. In combination with an intermittently-revolving cylinder-gear, longitudinally-movable racks mounted on opposite sides of said gear, and means for supporting inoperable and for raising and lowering, the rack-frames consisting of vibrator-frames 39 and blocks 39′.

Signed at Norwich, Connecticut, this 11th day of January, 1900.

EDWIN OLDFIELD.

Witnesses:
ALONZO M. LUTHER,
FRANK H. ALLEN.