Dec. 8, 1925.

1,564,386

W. S. WELLS

LOOM

Filed Jan. 31, 1923

5 Sheets-Sheet 1

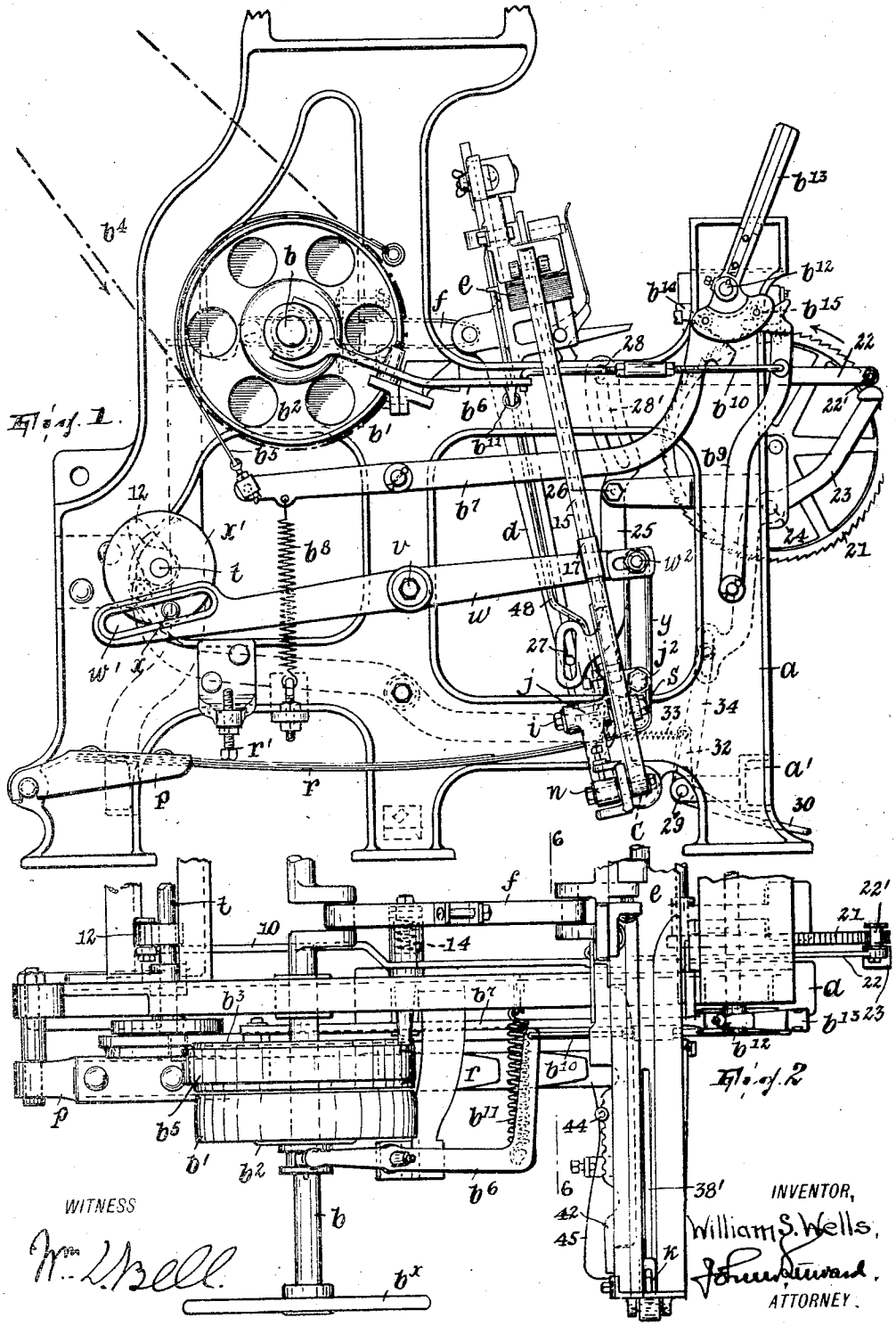


Fig. 1.

Fig. 2.

WITNESS

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Dec. 8, 1925. 1,564,386

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LOOM

Filed Jan. 31, 1923 5 Sheets-Sheet 2

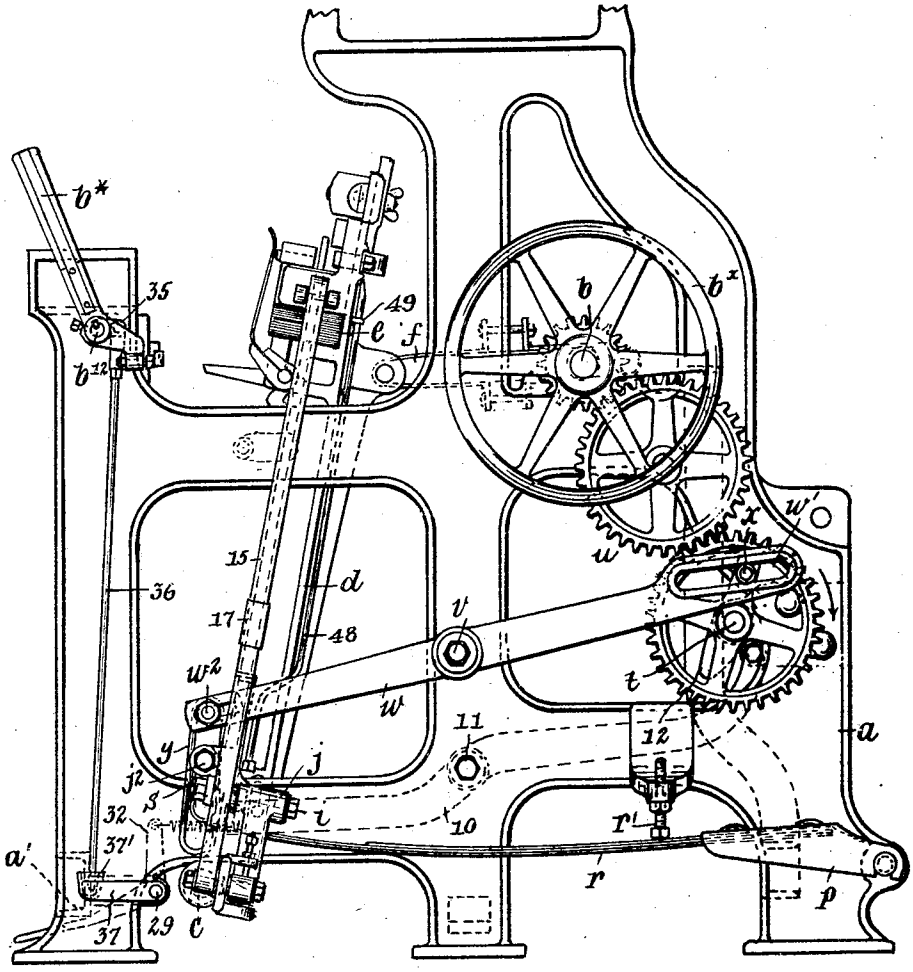


Fig. 3.

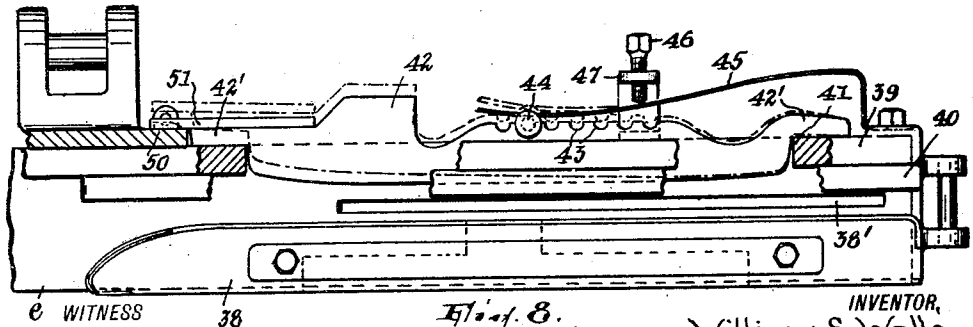


Fig. 8.

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Dec. 8, 1925. 1,564,386

W. S. WELLS

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Filed Jan. 31, 1923 5 Sheets-Sheet 3

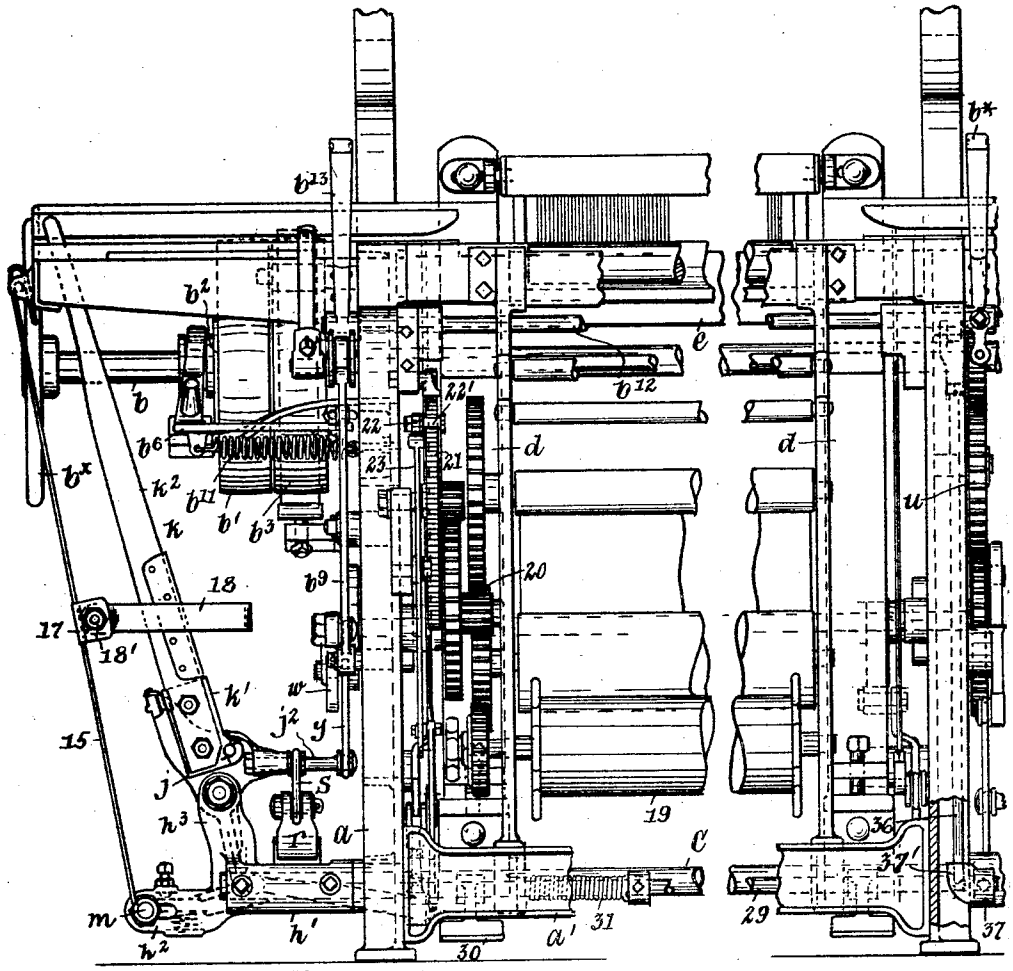


Fig. 4.

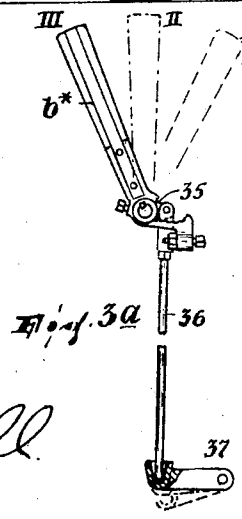


Fig. 3a

WITNESS

Wm. L. Bell

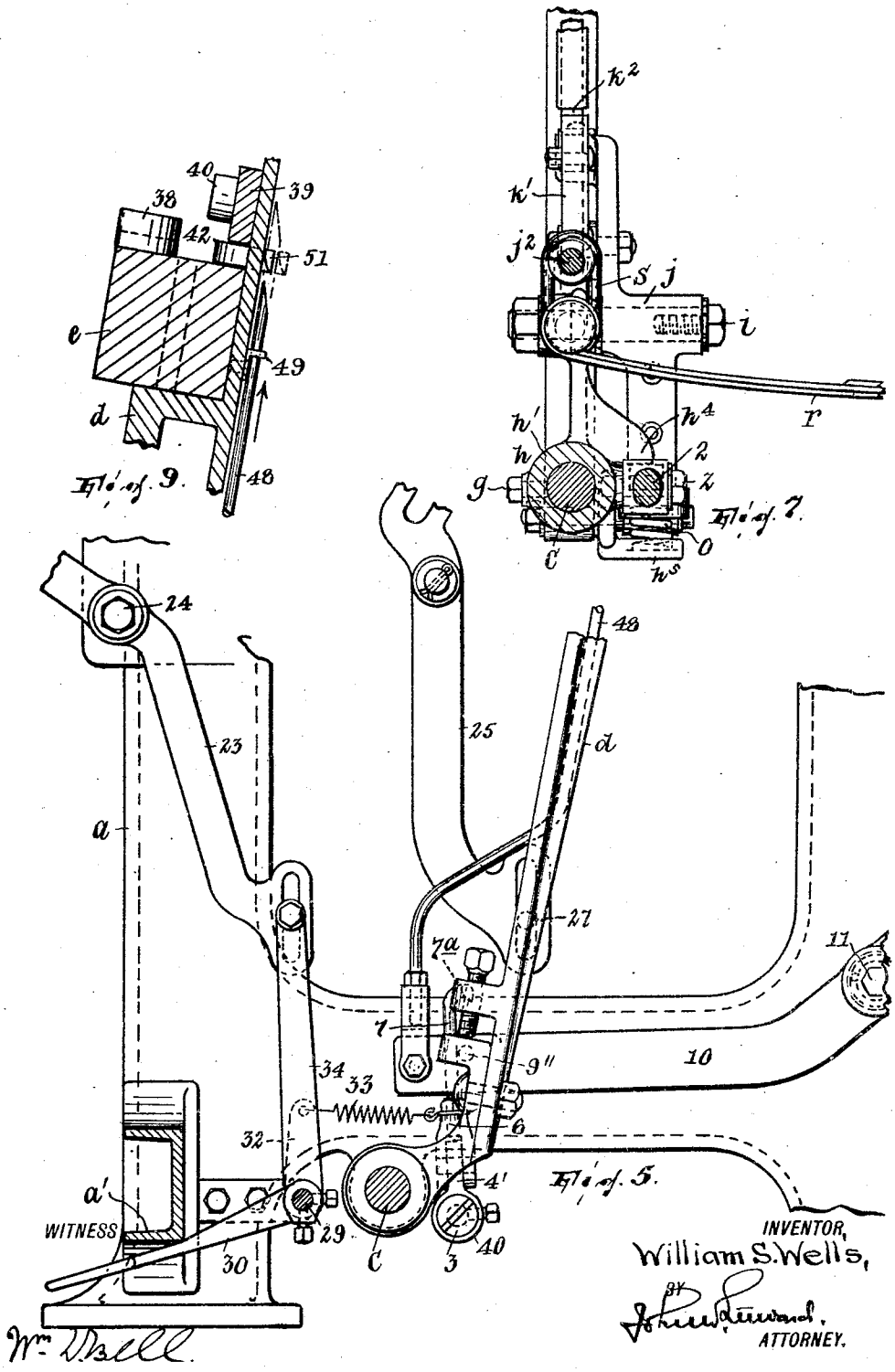
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Dec. 8, 1925. 1,564,386

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LOOM

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Dec. 8, 1925. 1,564,386

W. S. WELLS

LOOM

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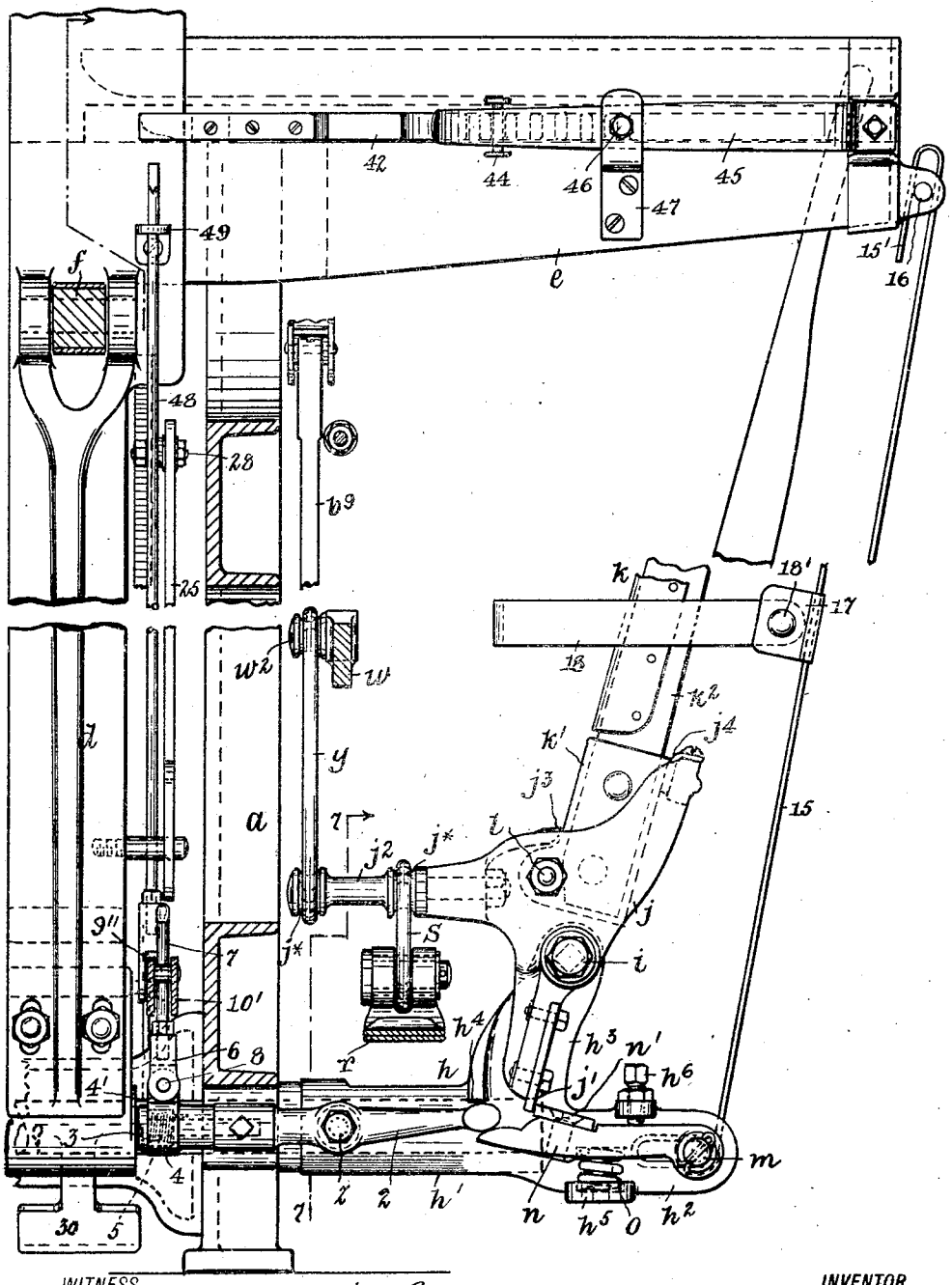


Fig. 6.

WITNESS

INVENTOR,
William S. Wells.
BY
ATTORNEY

Patented Dec. 8, 1925. 1,564,386

UNITED STATES PATENT OFFICE.

WILLIAM S. WELLS, OF SOUTH BETHLEHEM, PENNSYLVANIA, ASSIGNOR TO BENJAMIN EASTWOOD COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

LOOM.

Application filed January 31, 1923. Serial No. 615,988.

To all whom it may concern:

Be it known that I, WILLIAM S. WELLS, a citizen of the United States, residing at South Bethlehem, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Looms, of which the following is a specification.

This invention relates to looms, and it consists in certain improvements in looms of the type in which the throwing of the shuttle is effected by spring power, said improvements contemplating increasing the efficiency of the loom, facilitating its control by the operator, and adapting it to withstand wear and tear and particularly that which is incident to the use of spring power for performing the work indicated.

In the drawings,

Fig. 1 is a left side elevation of the improved loom;

Fig. 2 is a plan view of the near side portion thereof in Fig. 1;

Fig. 3 is a right side elevation;

Fig. 3ª is a detail view illustrating means for disconnecting certain mechanisms from the means which actuates them, when the loom is stopped;

Fig. 4 is a front elevation;

Fig. 5 is a vertical sectional view of the front part of the loom, illustrating particularly the means for cutting out the action of the take-up and picking or shuttle-throwing means, and also (in part) the means for releasing the pressure on the shuttle at the moment it is to be impelled across the lay.

Fig. 6 is a sectional view on line 6—6, Fig. 2, looking forward;

Fig. 7 is a sectional view on line 7—7, Fig. 6, looking in the direction of the arrow;

Fig. 8 is a plan, partly in section, of one of the shuttle boxes; and

Fig. 9 is a vertical sectional view further illustrating the means for releasing the pressure on the shuttle at the moment it is to be impelled.

a is the frame; b the crank-shaft journaled therein and b^x its hand-wheel; c the rock-shaft on which are fixed the lay-swords d for the lay or batten e; and f the pitmen connecting the lay-swords with the crank-shaft.

Crank-shaft b has, revoluble thereon, the driving pulley b' and, splined thereon, the clutch member b^2 coactive with a part of pulley b' as a clutch member; also, fixed thereon, the brake-pulley b^3. b^4 is the driving belt. b^5 is a brake-band attached at one end to the frame and embracing the brake-pulley. b^6 is a bell-crank lever fulcrumed in the frame and having a fork engaged in a peripheral groove of the clutch member b^2 and its forward end projecting inwardly. b^7 is a lever fulcrumed in the frame between its ends and having its rear end connected to the free end of the brake-band and its other end upturned and provided with a forward slope or incline. A spring b^8 normally holds this lever in the brake applying position. b^9 is a lever fulcrumed at one end in the frame forward of lever b^7 and having its upper end formed with a rearward slope or incline, and b^{10} is a pitman connecting b^6 and b^9. A spring b^{11} normally causes lever b^6 to hold clutch member b^2 in the idle position. b^{12} is the controlling shaft, and b^{13} and b^* are controller handles thereon, b^{14} and b^{15} being rollers in a depending part of the handle b^{13} respectively adapted to bear on the inclines of the levers b^7 and b^9. This mechanism is fully set forth in my application Ser. No. 611,722, and it needs no further description except to say that when the controller consisting of the controlling shaft and its handles is turned to position III (Fig. 3ª) it acts through levers b^9 and b^7 to maintain the clutch member b^2 in driving relation to pulley b' and the brake-band released, so that the loom is driven and when the controller is turned back to position I the clutch member is moved to idle position and the brake-band frictionally grips the brake-pulley, the loom being then stopped, and when the controller occupies the intermediate position II said clutch member is in the idle position and the brake-band is released so that the loom may be turned over by hand.

Picking mechanism.—On the ends of the shaft c are secured, by set-screws g (Figs. 4 and 7), the sleeve-portions h' of reverse counterpart brackets h each having at its outer end a slotted extension arm h^2 (Fig. 6) and an upstanding arm h^3; each bracket also has a downwardly facing stop h^4 and on the arm h^2 a spring-seat h^5 and, above this seat, an adjustable stop h^6 here in the form of a set-screw. On a stud i in each arm is

fulcrumed a casting forming the carrier-lever or carrier j for the picker stick k; one arm thereof projects downwardly and is shod with a projecting hardened plate j' forming a cocking shoulder, another arm projects inwardly and has a stud j^2 provided with two peripheral grooves j^*, and a third arm projects upwardly and has two spaced stops j^3 j^4. The picker stick includes a metal socket k' fulcrumed on a bolt l in the carrier and having slight play from one to the other of the stops j^3 j^4, and the stick proper k^2, which is preferably of wood and is guided in a slot (38') in the batten as will appear. On a stud m in the extension arm h^2 of bracket h is fulcrumed a cocking shoe n having a hardened plate n' to afford a cocking shoulder to dog the cocking shoulder j' of the carrier j; it is normally held up against stop h^6 by a spring o seated on the seat h^5.

Each carrier is impelled in the direction to throw the shuttle by spring means consisting of a shoe p fulcrumed on a stud q at the back of the loom side and a leaf spring r secured to the shoe and having at its free end (Figs, 1, 3, 4, 6 and 7) a metal or other stiff link s which is looped over the stud j^2 and engaged in the relatively inner groove j^* thereof; the necessary downward pressure of the spring is obtained by a set screw r' bearing on the same between its ends. The carrier is moved in the opposite direction, so as to become cocked by engagement with the cocking shoe n as described, by the following means: Journaled in the loom frame at the back thereof is a countershaft t which by the gearing u shown in Fig. 3 is geared to the crank shaft b to rotate therewith in a 1 to 2 ratio. In the sides of the loom frame, on studs v, are fulcrumed levers w the rear ends of which have slots w' receiving the diametrically opposite studs x one of which may be on that gear u (Fig. 3) which is on the shaft t and the other on a face plate x' (Fig. 1) on said shaft. Looped over peripherally grooved studs w^2 set in slots in the forward ends of the levers w are depending metal or other stiff links y which are also looped over the respective studs j^2 of the carriers and are engaged in their relatively outer grooves j^*. The levers w are vibrated in opposite directions due to the diametrically opposite relation of the studs x; thus, on account of the ratio of the gearing connecting the shafts b and t, on the alternate cycles of shaft b (or alternate movements of the lay) one carrier and on the remaining such movements the other carrier will be moved to the cocked position. (It will be seen that loops s and y are confined against side play by the grooves j^*.) On the cycle when one carrier is being cocked the other is released by the following means: Fulcrumed on a stud z (Figs. 6 and 7) in each bracket h is a lever 2 one end of which is interposed between stop h^4 and the free end of shoe n. On a headed stud 3 projecting from the other end of this lever is arranged to oscillate a collar 4 (Figs. 5 and 6) which is normally urged rearward, or clockwise in Fig. 5, by a spring 5 concealed in the collar and which may have one end secured in the stud and the other in the collar. The clevis portion 6 of an upstanding hook 7 straddles and is pivoted to a radial arm 4' projecting from this collar, the pivot 8 between the clevis and collar being arranged in the plane in which the collar rotates so that the hook remains in a vertical plane in any position of the lever 2 around its fulcrum. The hook is received in the fork 10' of a lever 10 fulcrumed at 11 in the side of the loom frame and it is normally held by the spring 5 with its shank bearing against a pin 9'' traversing said fork. On the shaft t is a pair of cams 12 respectively set approximately diametrically opposite the corresponding studs x, and against these the rear ends of the levers 10 respectively bear, being held in contact therewith by springs 14 (Fig. 2) which are coiled within the hubs of the levers 10 and each of which is at one end secured to the hub and at the other end to the stud 11 on which the lever is fulcrumed. Each time a lever 10 has its rear end depressed by its cam 12 the pin 9'' at its forward end encounters the hooked end of the hook 7 and tilts the lever 2, thereby tripping the cocking shoe n and thus releasing the corresponding carrier j so that the picker stick is thrown inward and the shuttle impelled across the lay. The hooks or couplings 7 may be moved out of the paths of pins 9'' as will appear, so that the tripping of shoes n and thus the picking motion may be stopped. So far as I am aware it is broadly new, given an actuator (as t—x—12), a cockable picking member (as j—k) movable back and forth and having a spring normally urging it in one direction, and a cocking device (as n) for said member, to effect the cocking and tripping of said member by separate means (as w—y and 10—7—6—2) actuated independently of each other by the actuator to alternately effect such cocking and tripping and each including another member (as w or 10) movable back and forth.

The impelling movement of the picker stick is checked by a resilient stop or cushion as follows: A metal plate spring 15 has one end pivoted or otherwise attached to the bracket h, as by being bent around the stud m. Its upper end is rebent inwardly to form a hook 15' and this hook receives a pin 16 on the end of the lay e. On the plate spring is a clip 17 to which is attached a leather loop 18 which receives the picker stick. The impelling movement of the picker stick is

thus at a suitable point in the stroke assumed by the spring 15. The loop may be adjusted up or down on the spring by manipulating the bolt 18′ by which the loop and clip are connected and the latter clamped to the spring.

It will be observed that whereas the picking devices *j*—*k* move back and forth with the batten-including structure the means for cocking and tripping them is arranged on the frame. This is not broadly new (see the Zeedyk Patent No. 1,428,410), but it is new to construct the said means as separate instrumentalities (*w* and 10) which respectively perform the cocking and tripping.

Take-up mechanism.—The cloth-beam is indicated at 19 and it is driven by gearing 20 (Fig. 4) from the ratchet wheel 21 journaled in one side of the frame *a*. A pawl-bar 22 (Figs. 1 and 2) is arranged to slide on a rest 23 which is a lever fulcrumed in the frame at 24, the pawl or tooth 22′ of the pawl-bar being adapted as the latter moves back to engage a tooth of this ratchet wheel and turn it and consequently the beam in the direction to wind up the cloth. The pawl-bar is pivotally connected at its rear end to a lever 25 fulcrumed at 26 in the frame and being adapted to be oscillated by the batten-including structure by having a slot-and-pin connection 27 with one of the lay-swords. The extent of each increment of advance of the ratchet-wheel may be varied by adjusting the pivot 28 between the pawl-bar and the lever 25 in a slot 28′ in the lever (so that the pivot is moved generally toward and from the fulcrum of the lever), said slot being curved to an arc of which the point of support of the pawl-bar on the rest 23 is the center.

Cut-out mechanism.—A rock-shaft 29 is journaled in the lower part of the frame near the floor, carrying two treadles 30, one at each side of the loom; it is normally urged anti-clockwise in Fig. 1 by a spiral spring 31 (Fig. 4) to a limit afforded by upward contact of the treadles with a part *a′* of the frame. On the shaft 29 are two cranks 32, respectively, yieldingly connected with the hooks 7 by the springs 33 (Fig. 5) each stronger than spring 5 and another crank 34 on said shaft has a slot-and-pin connection with the lever 23. The weaver frequently has occasion to "turn the loom over" without operating the shuttle or advancing the sheet of warp and fabric, as in "finding the pick." In the ordinary loom he would first remove the shuttle and also in some way stop the feed of the take-up mechanism, as by putting out of action the pawl that turns the ratchet wheel (or, as to the take-up mechanism, he may leave it operative and re-set it after the "turning over" of the loom is finished); the "turning over" of the loom he then does by hand, as by turning the crank shaft by its hand-wheel such as b^x. According to the mechanism last above described he can turn over the loom by power without the shuttle being impelled or the take-up mechanism actuated by properly manipulating the controller (i. e., moving it to the described position III in Fig. 3ª) and meanwhile depressing one of the treadles 30, so that the coupling afforded by each hook 7 is withdrawn out of position to be caught by pin 9″ on lever 10 and pawl-bar 22 is elevated too high to effect rotation of ratchet-wheel 21. Cutting out of the tripping means for the picker device *j k* and also the take-up mechanism is effected automatically when the controller is moved from position III, so that any manual shifting of the batten or crank-shaft would not involve operation of said means and mechanism, as follows: On the controller shaft b^{12} is a crank 35 from which depends a push rod 36 whose lower end seats in a socket of a crank 37 on the rock-shaft 29 (Fig. 3ª). In position III of the controller the push-rod stands above or spaced as shown from the bottom of the socket, but on moving the controller backward the push-rod depresses crank 37; this depressing is sufficient even at position II to cause the rest 23 and hook 7 to be moved to their idle positions. The return of rocking structure 29—30—32—34 to idle position is of course effected by spring 5. Spring 33 allows said structure to undergo depressing movement although, on account of a notch 7ª produced by rebending the end of coupling 7, the latter is so engaged with pin 9″ that it cannot be uncoupled until lever 10 descends sufficiently to permit the coupling to be pulled clear of pin 9″; in the position of the parts as shown in Fig. 5 this uncoupling is possible because the lever has descended, clearing pin 9″ from the notch.

When the attendant cuts out the picking action by means of said rocking structure, since it is foot-actuated he has both hands free for such manipulations as the circumstances may require. In this connection it is new, so far as I am aware, given going mechanism (as *b*, *u*, *t*, *x*, *w*, 12, 10) having means (as *y*) to move a spring-pressed picking member to cocked position, and means, actuated by said mechanism, to trip said member after each cocking thereof (as the hook 7 and lever 2) which means includes a disconnective coupling, to provide means to disconnect the coupling while said mechanism continues going.

Shuttle boxes.—38 indicates the front wall (at either end of the lay) of a shuttle-box, 39 its back wall and 40 a strip attached thereto and forming the overhang or top of the shuttle-box (Figs. 8 and 9). 38′ is the slot in which the picker stick *k* moves. The rear wall has a slot 41 therein to receive the inwardly projecting portion of a swell 42

which at the back has a longitudinal row of notches 43 and at each end has an ear or extension 42′ bearing against said back wall. Any one of these notches is adapted to receive a bearing-pin 44 against which takes the free end of a plate-spring 45 which is secured to the outer end of the wall 39 and the pressure of which may be adjusted by a set-screw 46 tapped into a bracket 47 projecting from the lay, the set-screw engaging the spring 45 between bearing-pin 44 and its outer end. When the shuttle enters the box it bears against the near end of the swell, tilting it outward on its outer ear 42′, and when it is about half-boxed the swell is shifted thereby, tilting on its bearing 44 to a position parallel to its original position. In this way the friction between the shuttle on the one hand and the front wall and the swell of the box on the other is gradually increased, due in part to the tension of the spring being increased and in part to the extent of bearing surfaces in contact with each other being increased—it being observed that a very material part of the length of the acting face of the swell is so formed as to assume face to face contact with the shuttle when it becomes more or less fully boxed.

When the shuttle is to leave the box the pressure of the swell thereon is relieved thus: Pivotally connected to the forward end of each lever 10 is an upstanding rod 48 whose upper end travels in a guide 49 on the back of the lay. The upper end of the rod is beveled forward and is adapted to enter between a suitable surface 50 on the back of the lay and a projecting tongue 51 on the swell 42. Thus, each time a lever 10 rises to trip the picking device it acts through the rod 48 to cam back the swell just before the picking device is tripped, so that the shuttle leaves the box with the pressure of the spring 45 thereon greatly reduced.

Regarding *t*—*x*—12 as the actuator for the picking and tripping means, the parts *x* thereof (each being a pin travelling in a circle) are calculated to produce movements of the levers 10 which are gradually retarded as the picking devices approach cocking position. But the parts 12 thereof (each being a cam, and in the present case pointed to present a steep surface to lever 10) are adapted to effect quick movements of the levers 10 to tripping position, it being found that when the tripping movements of these levers are effected slowly the tripping is not capable of being timed to a nicety because jars or vibration in the loom become then a factor in causing at times premature tripping.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In combination, with the supporting structure of a loom, a cockable picking member movable back and forth therein and having a spring normally urging the same in one direction and movable in the other direction to cocked position, a cocking device for said member, a going actuator, and separate cocking and tripping means actuated independently of each other by said actuator to alternately cock and trip said member each including another member movable back and forth in said structure.

2. In combination, with the supporting structure of a loom, a cockable picking member movable back and forth therein and having a spring normally urging the same in one direction and movable in the other direction to cocked position, a cocking device for said member, a going actuator, and separate cocking and tripping means actuated by said actuator to alternately cock and trip said member each including a lever oscillatory in said structure in an upright front-to-rear plane.

3. In combination, with the supporting structure of a loom, a cockable picking member movable back and forth therein and having a spring normally urging the same in one direction and movable in the other direction to cocked position, a cocking device for said member, a going actuator, and separate cocking and tripping means actuated by said actuator to alternately cock and trip said member each including a lever oscillatory in said structure, the part of the actuator which actuates the tripping means being a cam.

4. In combination, with the supporting structure of a loom, a cockable spring-pressed picking member movable in said structure, means to hold said member in cocked position, going mechanism having means to move said member to cocked position, means, actuated by said mechanism, to trip said member after each cocking thereof, the last-named means including a disconnective coupling, and means to disconnect the coupling while said mechanism continues going.

5. In combination, with the supporting structure of a loom, a cockable spring-pressed picking member movable in said structure, means to hold said member in cocked position, going mechanism having means to move said member to cocked position, means, actuated by said mechanism, to trip said member after each cocking thereof, the last-named means including a disconnective coupling spring-held in coupling position, and means to move the coupling out of coupling position.

6. In combination, with the supporting structure of a loom, a cockable spring-pressed picking member movable in said structure, means to hold said member in cocked position, going mechanism having

means to move said member to cocked position, means, actuated by said mechanism, to trip said member after each cocking thereof, the last-named means including a disconnective coupling spring-held in coupling position, stopping means for said mechanism, and means, actuated from said stopping mechanism, to move the coupling out of said position.

7. A loom picking mechanism including a cockable spring-pressed picking member, means to hold the same cocked, means to move said mechanism to cocked position, and back and forth moving mechanism to trip the first-named mechanism including a coupling device and a device with which said coupling is engageable, said coupling being movable transversely of the path of movement of the latter mechanism so as to clear the other device and one of said devices having a notch in which the other is engageable and adapted to oppose such lateral movement of the coupling device when once engaged with the other device.

In testimony whereof I affix my signature.

WILLIAM S. WELLS.