No. 845,232. PATENTED FEB. 26, 1907.

C. M. HANSEN.

WEFT REPLENISHING MECHANISM FOR LOOMS.

APPLICATION FILED FEB. 2, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

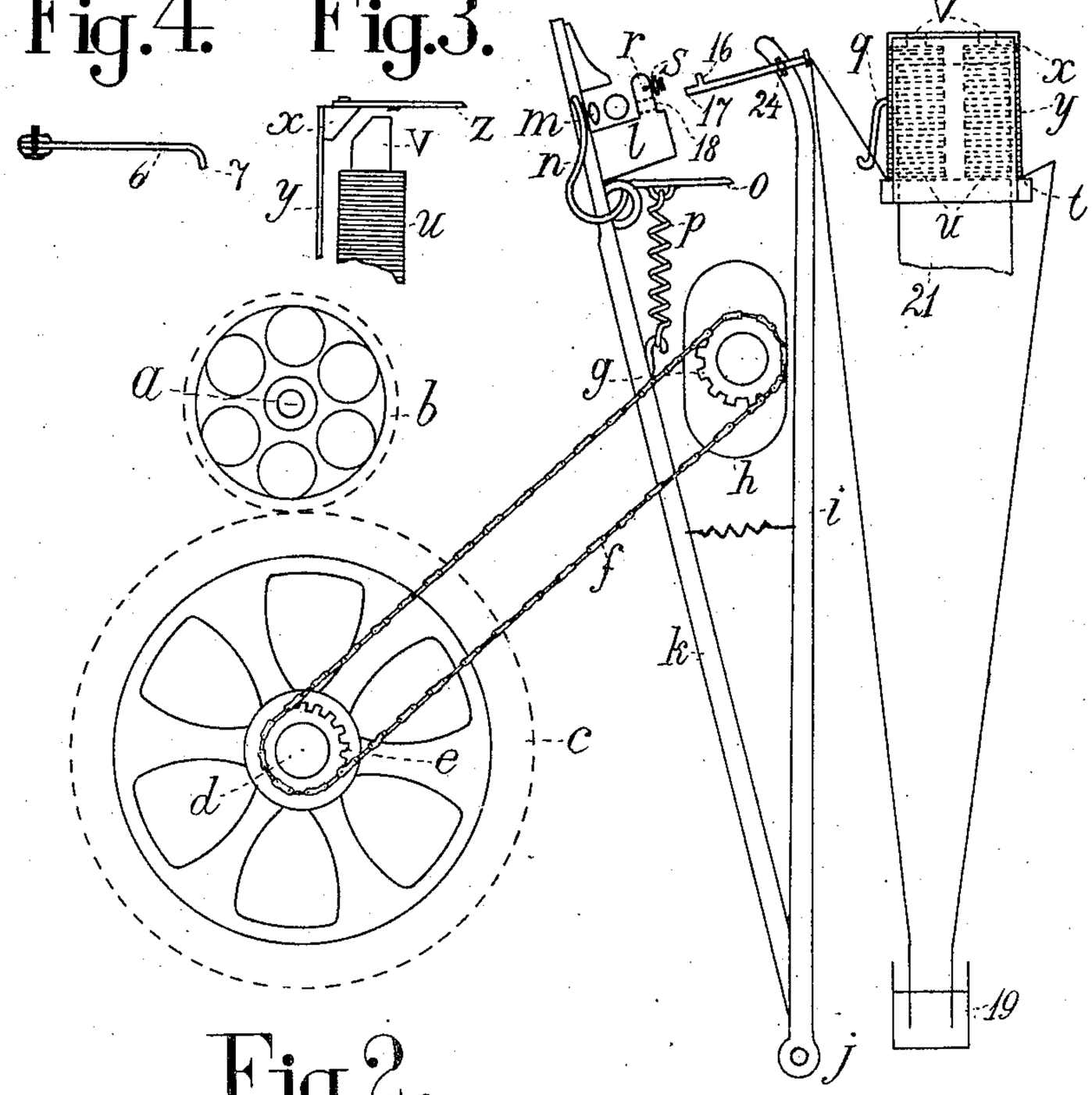


Fig. 4.

Fig. 3.

Fig. 2.

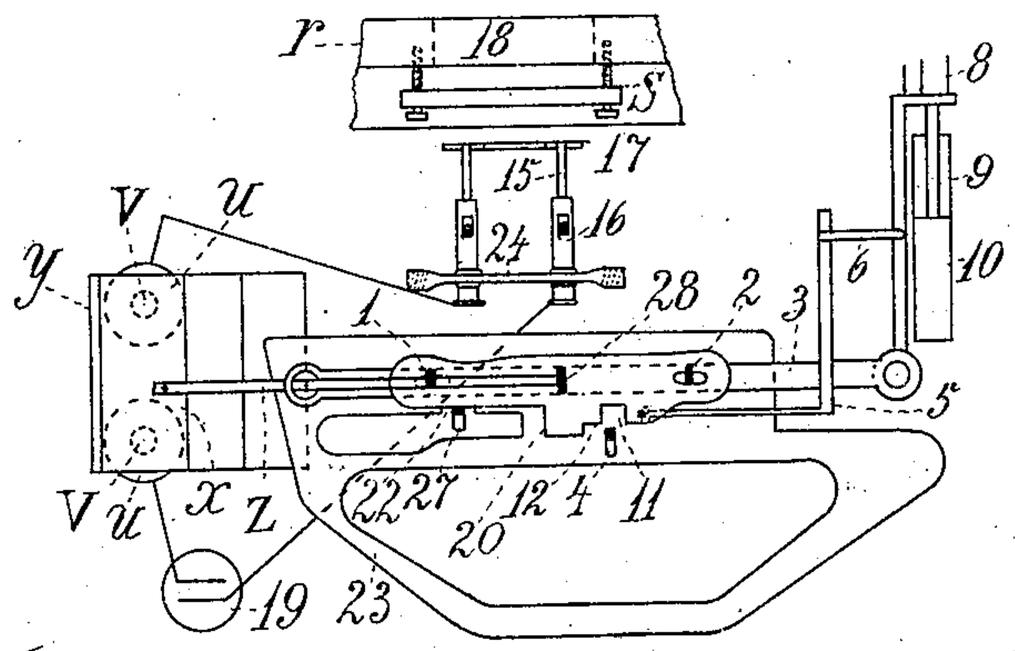
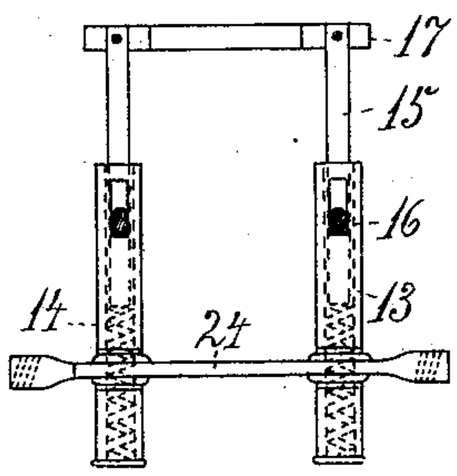


Fig. 5.



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WEFT REPLENISHING MECHANISM FOR LOOMS.

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2 SHEETS—SHEET 2.

Fig. 6.

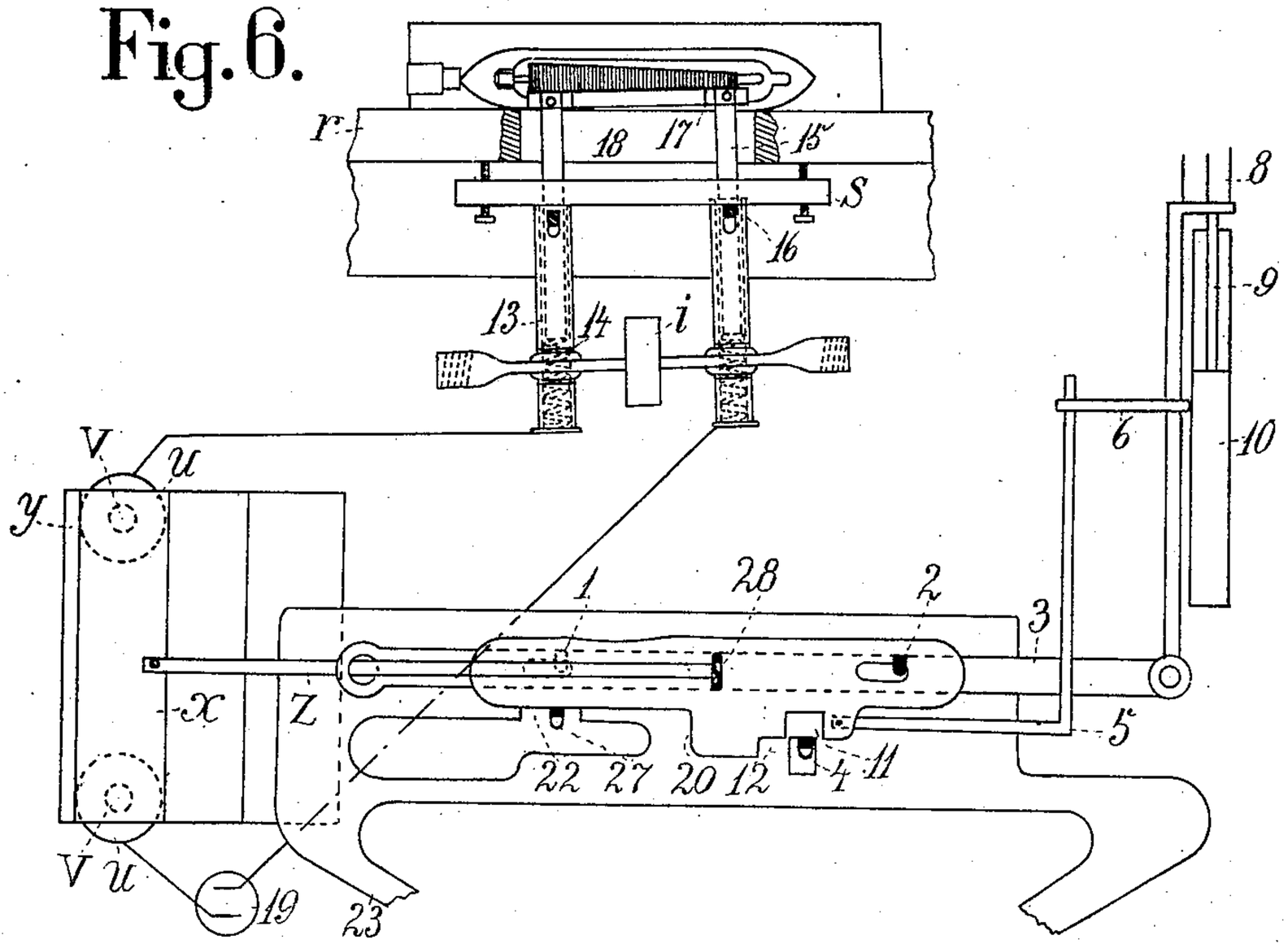
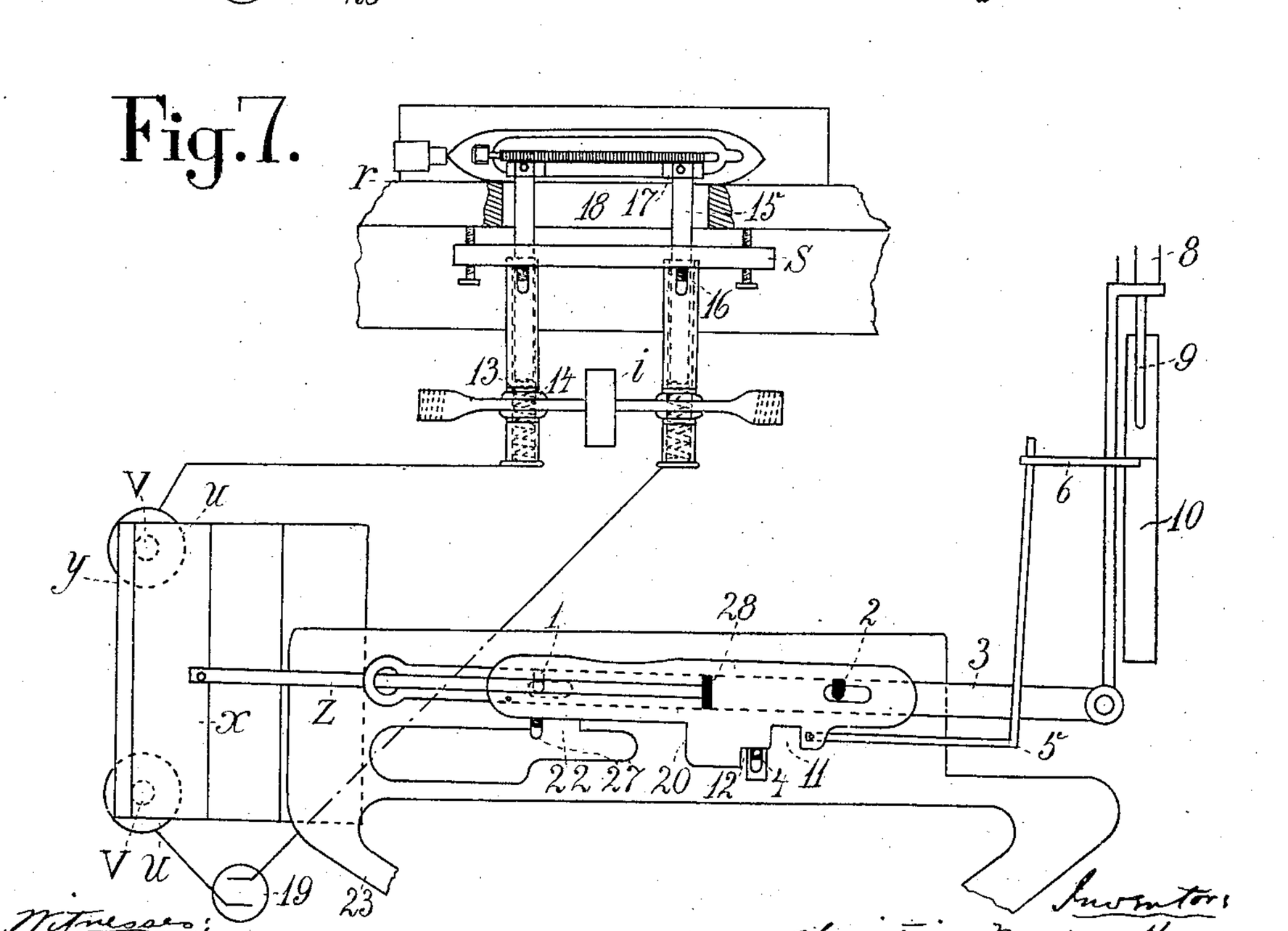


Fig. 7.



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WEFT-REPLENISHING MECHANISM FOR LOOMS.

No. 845,232. Specification of Letters Patent. Patented Feb. 26, 1907.

Application filed February 2, 1903. Serial No. 141,603.

To all whom it may concern:

Be it known that I, CHRISTIAN MARIUS HANSEN, a citizen of the Kingdom of Denmark, (my post-office address being Havnegade 6, Vejle,) have invented certain new and useful Improvements in Weft-Replenishing Mechanism for Looms, of which the following is a specification.

In looms as heretofore generally constructed of that kind having automatic shuttle-filling and threading mechanism—that is to say, those in which the shuttle is automatically changed when the weft on the spool breaks or is used up—weaving faults must necessarily be produced in the texture, because the weft will be missing in a larger or smaller piece unless it accidentally breaks or is used just at the end of the shuttle's movement, which, as a matter of course, is very seldom the case.

The present invention has for its object to obviate these drawbacks by automatically effecting exchange of the shuttle before all the weft on the shuttle is used or in case of the breaking of the weft the stoppage of the machine.

In the accompanying drawings I have shown a form of device embodying my invention, which, however, is given as an example only, as the device without essential changes may be fixed on any loom.

Referring to the drawings, Figure 1 shows a side view of the device; Fig. 2, a plan of the same, and Figs. 3 to 7 are details hereinafter referred to.

In the figures, *a* indicates the driving-shaft; *b*, a toothed wheel secured thereto and adapted to gear with a toothed wheel *c* on the shaft *d*.

The wheel *c* has twice as many teeth as the wheel *b*, and the shaft *d* is rotated at half the speed of the shaft *a*. On the shaft *d* is keyed a chain-wheel *e*, which by means of the chain *f* actuates the chain-wheel *g*, having as many teeth as the wheel *e*. On the shaft carrying the chain-wheel *g* is fixed an eccentric *h*, actuating a one-armed lever *i*, which by means of a spring (not shown in the figure) is drawn to the left, Fig. 1, while the eccentric will cause the lever *i* to be carried to the right at every second revolution. The lever *i* pivots around the spindle *j*, upon which is also pivotally mounted the lever *k*, on which is fixed a lathe *l*. In the ends of the lathe are arranged, as usual, a shuttle-box, the rear side of which is formed of a shuttle-box tongue *m*, pressed upon by the arm *n* of a two-armed lever, the other arm *o* of which is pulled down by means of the spring *p*. During the shuttle's motion in the shuttle-box the lever-arm *n* is forced to the left, Fig. 1, causing the arm *o* to go upward; but in order to prevent the latter from having too much play (which would cause the arm *n* to travel too far to the left, thereby disadvantageously affecting the guidance of the shuttle, which would prevent the effective operation of the device) there is arranged on the breast-beam 21 a bow *q*, which when the lathe *l* is moved to the right comes above the lever-arm *o*, thereby preventing too great a play of this latter.

On the right-hand side of the front wall *r* of the shuttle-box, Figs. 1 and 2, is arranged a contact-plate *s*, fixed by means of two screws. By means of these two screws it is possible to fix the said plate in different positions relatively to the shuttle-path, which is of great importance, because by this means there may be used for the weft any spool of pasteboard, wood, zinc, or the like of a cylindrical or conical form, it being possible by means of the screws to place the contact-plate parallel to the generator on the spool which is nearest to it, and the plate may also be placed nearer to or farther from the spool, making it possible, according to the thickness of the spool, to adjust the device to operate when there is left a single or a couple of windings of weft on the spool at the moment the shuttle is changed. On the breast-beam 21 is fixed a plate *t*, on which are fixed two electromagnets *u*, Figs. 1 and 2, connected with an electric battery 19.

The poles of the electromagnets *u*, Figs. 1, 2, and 3, are cut off slantingly, and the armature *x*, likewise cut off slantingly, is fixed to a spring-plate *y*, Fig. 3, which latter tends to keep the armature away from the poles. To the armature *x* is attached a rod *z*, Figs. 2 and 3, which in turn is screwed to the projection 28 of a guide-plate 20. This latter is provided with two slots in which engage corresponding guide-screws 1 and 2, Fig. 2, so that the plate is guided in its movement on the clutch-rod 3, which in known manner is moved backward and forward, thus actuating the lever 4, which likewise in the known

manner causes the shuttle to be automatically exchanged. To the guide-plate 20 is attached a rod 5, bent in a right angle, which carries the hammer-catcher 6, having a small downwardly-bent hook 7, Fig. 4.

To the clutch-rod 3 is attached a weft-fork 8, which with its rearwardly-projecting rod 9 (owing to its being caught by the hammer 10 after the breaking of the weft) carries back the lever 3, and with it the guide-plate 20, by which formerly the exchange of the shuttle every time was accomplished. Heretofore the guide-plate had when it was in its usual position farthest to the left, Fig. 2, an edge which by means of the backward motion of the lever 3 actuated the lever 4, so that this was carried back and effected in the known manner the exchange of the shuttle. The guide-plate was only carried to the right, if for some reason the exchange of the shuttle was to be prevented. According to this invention the guide-plate 20, however, has to the left of the incision 11 a smaller incision 12. As now the guide-plate, on account of its connection with the armature *x*, in its normal position will be farthest to the left—that is, with the incision 11 just opposite the lever 4—then if the weft breaks the clutch will not be actuated and the exchange of the shuttle will consequently not take place. When, on the other hand, which will be hereinafter explained, the guide-plate 20 is carried to the right, when only, however, a small quantity of the weft remains on the spool, then the incision 12 will actuate the lever 4 and in this manner effect exchange of the shuttle.

Upon the lever *i*, Fig. 1, and just opposite the contact-plate S is fixed a "follower" apparatus, Figs. 1, 2, and 5, consisting of two small hollow steel cylinders 13, Fig. 5, in which are arranged two springs 14, actuating two rods 15, guided in slots in the cylinders 13 by means of pins 16. The rods 15 are pivotally connected, together by an insulating plate or follower 17. Owing to this pivotal connection each rod 15 may be moved backward independently of the other, so that if, for instance, the weft on the spool has spooled off unevenly, causing a heavier layer at one place than at another, there will be effected no contact, as in such a case one pin 16 only will touch the contact-plate *s*, Fig. 6. This mobility of the parts is also of essential importance where the contact-plate, on account of conical spools, is adjusted slantingly, as above described, as in such a case the two pins must be in different positions in order to effect the contact. The rods 15 are connected with electric wires, which after having been led to the coil of the electromagnet are carried to an electric battery 19. Behind the contact-plate the front casing of the shuttle-box is removed for a length 18 equal to the length of the insulation-plate 17, Figs. 1 and 2, and through which opening is carried the said insulation-plate or follower 17 every time the lever *i* moves to the left, Fig. 1, consequently at every second revolution of the driving-axle—that is to say, each time the shuttle in left-hand looms (to which the device here shown as an example is applicable) is in the shuttle-box to the left. As long, however, as there is sufficient weft on the spool the insulating-plate 17 will touch this, the rods 15 being then carried backward, causing the pins 16 to move so far back that they cannot touch the contact-plates *s*, Fig. 6. The pins will not therefore touch the contact-plate (thereby closing the circuit) until there is but a single or a couple of layers of weft left on the spool, Fig. 7. This causes the armature *x* to be drawn to the poles of the electromagnet. The rod *z*, and with it the guide-plate 20 and the hammer-catcher 6, will then be carried to the right, so that the latter catches in behind the hammer 10, which now, by its retrograde movement, produces the retrograde movement of the clutch-rod 3. The incision 12 will now actuate the lever 4, and in this manner the exchange of the shuttle is effected. In order to make the insulating-plate or follower 17 come into contact with the weft on the spool, there must, of course, in one side of the shuttle be made an oblong incision corresponding to the size of the insulating-plate.

The invention, which is especially applicable to automatic looms, in which it is of great advantage, may, however, also be applied to ordinary non-automatic looms, as the productive capability of the loom is increased by it.

The shuttle exchange is effected by the lever 4 being carried backward, by which means it will in known fashion turn a shaft, which through a lever connection actuates an eccentric which brings about the exchange. This latter contrivance is not shown, as it is already commonly known in looms.

The stoppage of the machine is effected by the disconnecting-rod 27 being carried backward and then drawn to the right by a spring which causes another rod in connection with it to guide the driving-belt onto a loose pulley. As this contrivance is also commonly used and well known, it is not shown in the drawings. When now the rod 6 is carried backward by the hammer 10, the guiding-plate 20, which is firmly connected with the rod 6, will also at the same time be carried backward. The lever 4 will then be actuated by the incision 12, which causes it to be carried backward and brings about the shuttle exchange. The guiding-plate 20 will now force the disconnecting-rod 27 out of the incision

22 in the shuttle-plate 23, in which it is resting when the loom is working. This will cause the stoppage of the machine, which will, however, only last as long as is required for accomplishing the exchange, after which the machine is again set going in the usual manner. When, on the contrary, the thread breaks, the rod 3 will be carried backward in known manner by the hammer 10, as in this case the hindmost end 9 of the fork 8 will not be lifted, because the fork is not in contact with the thread, and the disconnecting-rod 27 will now in consequence hereof also be carried backward, which causes the stoppage of the machine. No shuttle exchange will, however, be effected, as the incision 11 on the guiding-plate 20 is now opposite to the lever 4 and as the rod 6 is not carried to the right because the electric circuit is not closed, and the clutch for the same reason is not carried to the right.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a loom, a shuttle carrying weft, means for controlling the operation of weft-replenishing means the same comprising an electrically-actuated device, a normally open electric circuit containing said device, an exposed fixed terminal in said circuit secured to the lathe, two movable terminals independently movable into contact with the fixed terminal, a follower adapted to bear against the weft to limit the movement of the movable terminals and prevent the electric circuit from being closed until the weft has become exhausted to such a predetermined extent that both movable terminals contact with the fixed terminal.

2. In a loom, a shuttle carrying weft, means for controlling the operation of weft-replenishing means the same comprising an electrically-actuated device, a normally open electric circuit containing said device, an exposed fixed terminal in said circuit secured to the lathe, two movable terminals independently movable into contact with the fixed terminal, a follower adapted to periodically bear against the weft to limit the movement of the movable terminals and prevent the electric circuit from being closed until the weft has become exhausted to such a predetermined extent that both movable terminals contact with the fixed terminal.

3. In a loom, the combination of an exposed fixed terminal secured to the lathe, means for adjusting said terminal nearer to or farther away from the path of the shuttle, an electrically-actuated device, a normally open electric circuit containing said device, a shuttle-carrying weft, a movable terminal, a follower connected to said movable terminal and normally preventing contact thereof with the fixed terminal but adapted to permit contact therebetween to close the electric circuit upon exhaustion of the weft to a predetermined degree.

4. In a loom, a shuttle carrying weft, a fixed exposed terminal, a normally open electric circuit, an electrically-actuated device in said circuit, a follower adapted to contact with the weft, a rod connected to said follower, a terminal moving with said rod and normally limited in its movement by the bearing of the follower against the weft to prevent contact thereof with the fixed terminal but adapted to contact with the fixed terminal to close the electric circuit when the weft has been exhausted to a predetermined degree.

5. In a loom, a shuttle carrying weft, a normally open electric circuit, an electrically-actuated device in said circuit, a fixed exposed terminal secured to the lathe, a follower adapted to periodically engage the weft, a terminal moving with said follower but normally limited in its movement by the bearing of the follower against the weft, and a plate adapted to be shifted upon the exhaustion of the weft to a predetermined degree and consequent closing of the electric circuit.

6. In a loom, a guide-plate, an oscillating hammer, means shifting said plate to a predetermined extent upon the exhaustion of the weft, a lever movable to secure replenishment of the weft, and an extension to said guide-plate adapted while the plate is in its shifted position to be engaged by said hammer to transversely shift said plate into connection with said lever to move the same.

7. In a loom, a lever movable to secure replenishment of the weft, an oscillating hammer, a guide-plate provided with two cut-out portions of different depths the deeper of which is arranged to be opposite said lever upon breaking of the weft, a disconnecting-lever, a weft-fork connected to said plate and adapted to be engaged by the oscillating hammer upon breaking of the weft to shift said plate transversely into engagement with the disconnecting-lever to stop the loom only.

8. In a loom, a lever movable to secure replenishment of the weft, an oscillating hammer, a guide-plate provided with two cut-out portions of different depths the deeper of which is arranged to be opposite said lever upon breaking of the weft, a disconnecting-lever, a weft-fork connected to said plate and adapted to be engaged by the oscillating hammer upon breaking of the weft to shift said plate transversely into engagement with the disconnecting-lever to stop the loom, means for shifting said plate to bring the shallower cut-out opposite the said lever,

movable to secure replenishment of the weft and an extension connected to said plate and arranged to be engaged by the oscillating hammer to transversely move the plate while in its shifted position into contact with said lever whereby the shallow cut-out engages said lever to move the same.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CHRISTIAN MARIUS HANSEN.

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