

No. 646,905.

Patented Apr. 3, 1900.

H. I. HARRIMAN.

LOOM.

(Application filed Feb. 12, 1900.)

(No Model.)

3 Sheets—Sheet 1.

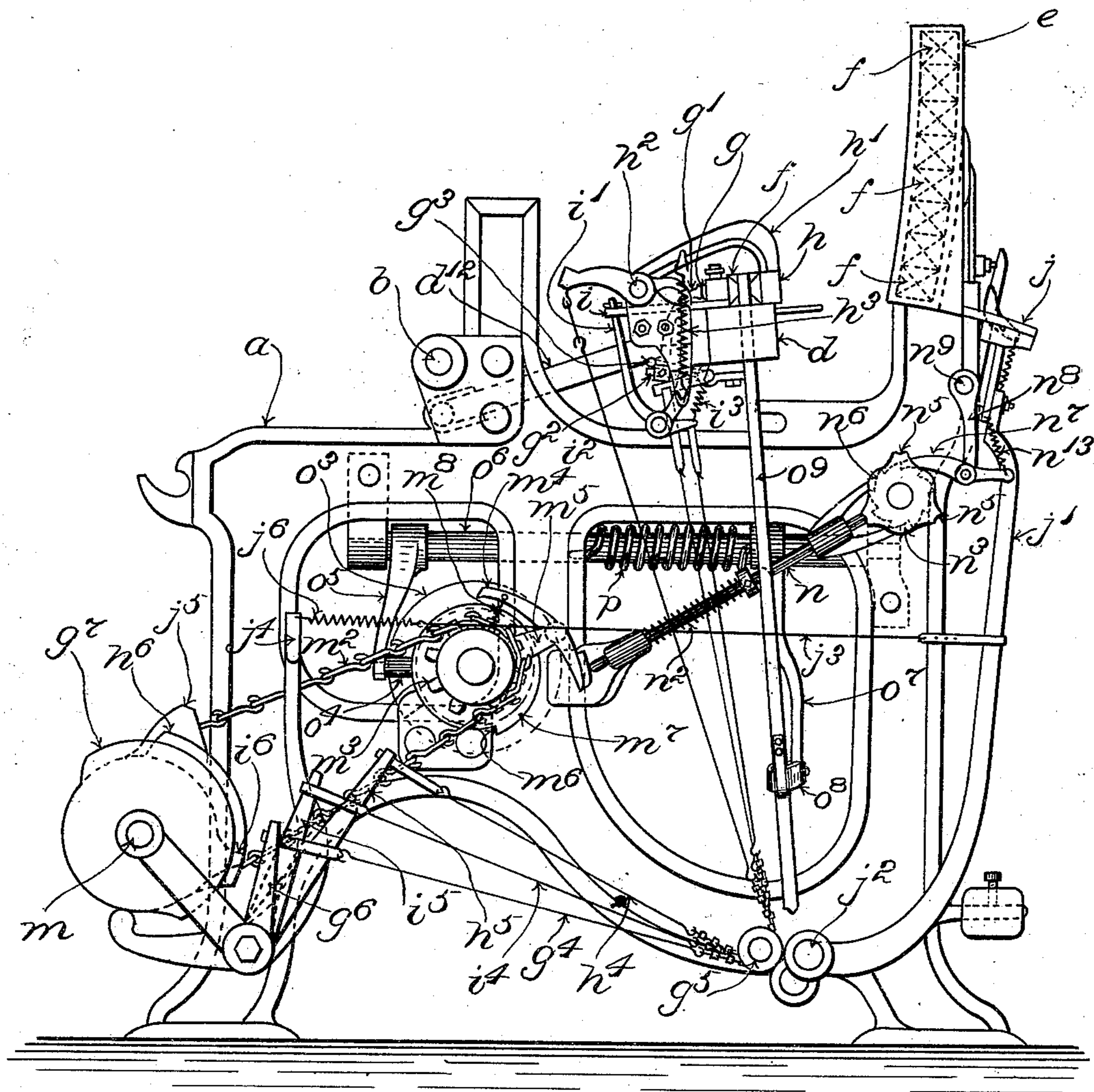


Fig. 1.

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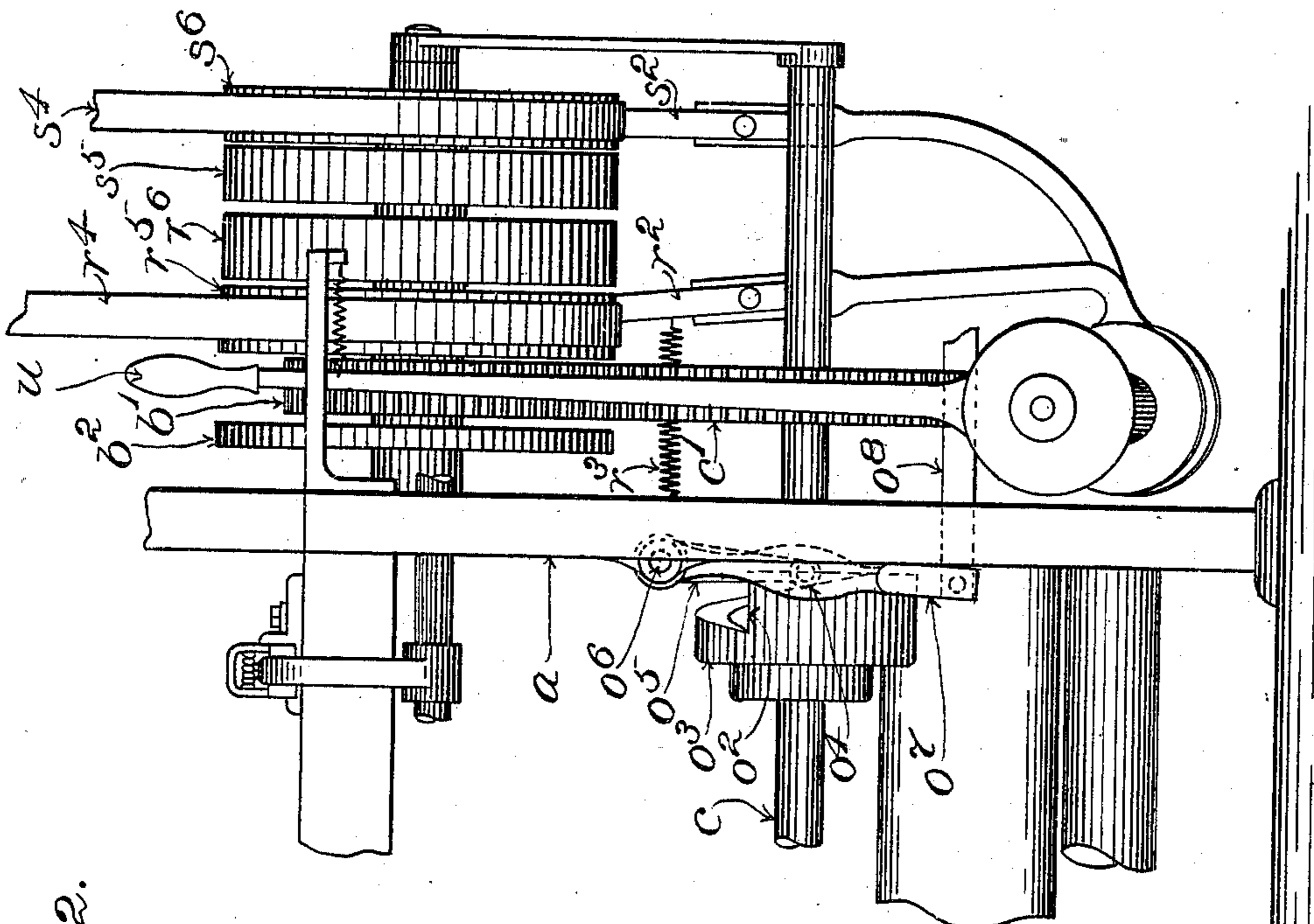
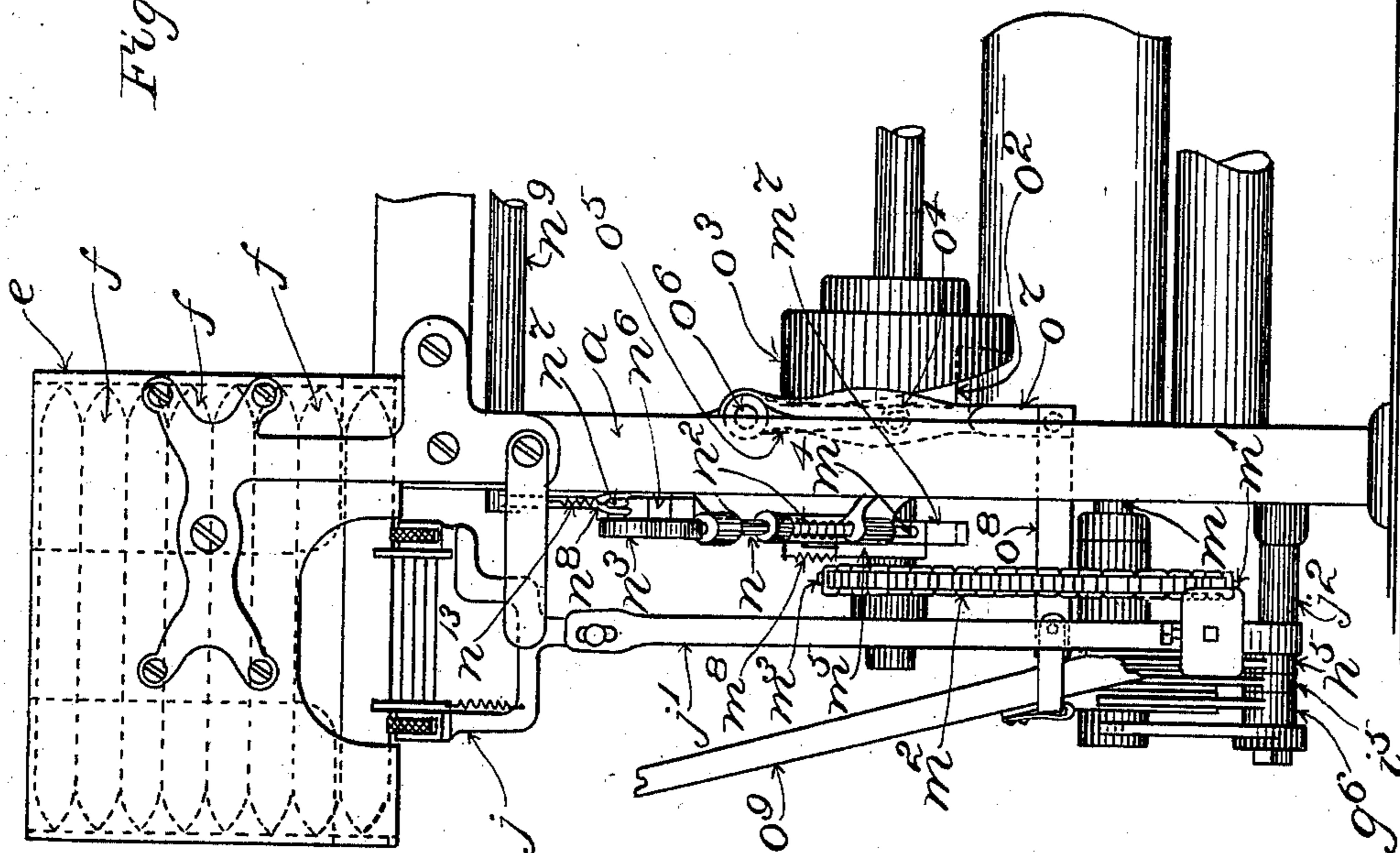


Fig. 2.



Witnesses

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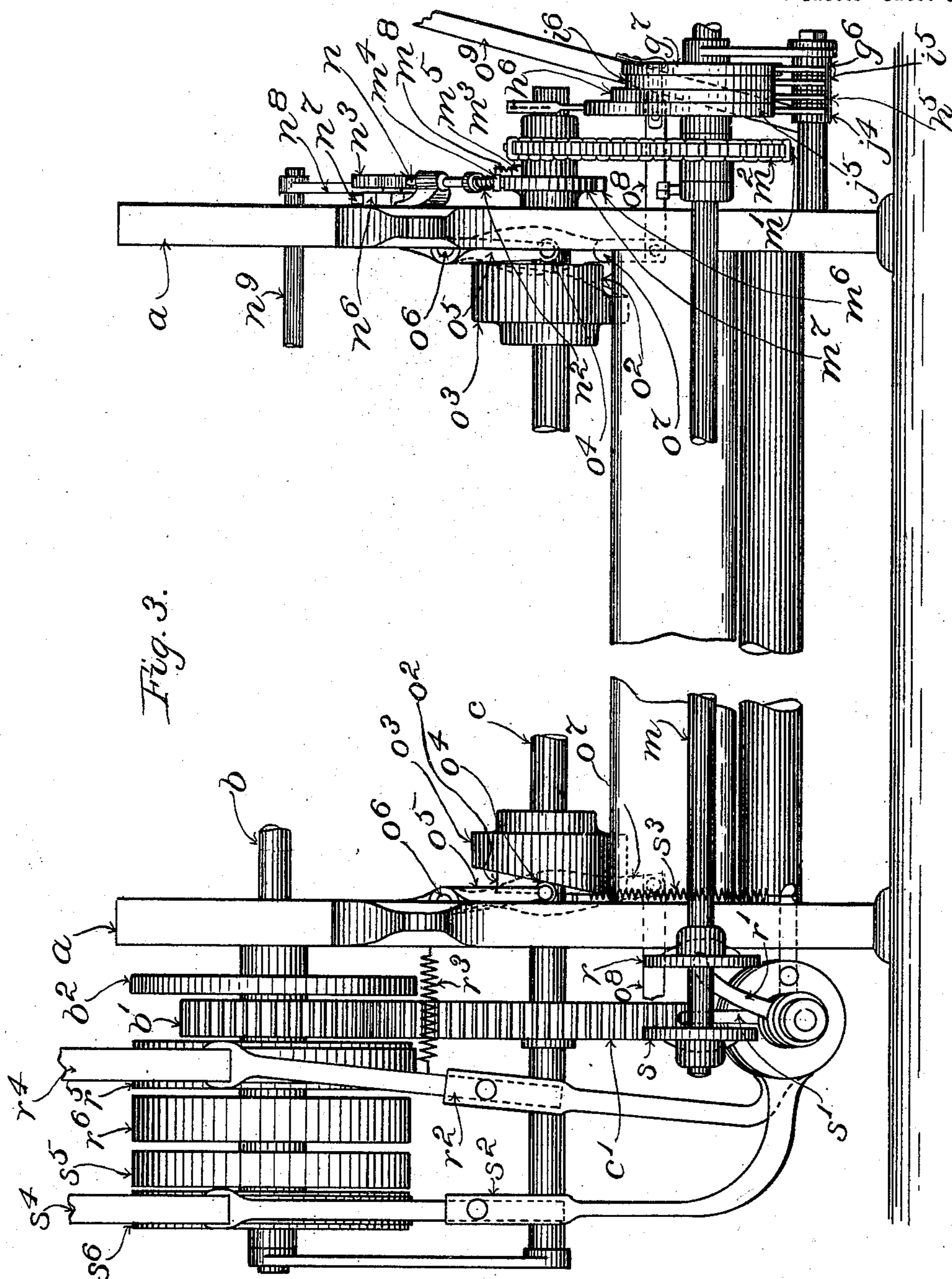
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

HENRY I. HARRIMAN, OF NEW YORK, N. Y.

LOOM.

SPECIFICATION forming part of Letters Patent No. 646,905, dated April 3, 1900.

Application filed February 12, 1900. Serial No. 4,896. (No model.)

To all whom it may concern:

Be it known that I, HENRY I. HARRIMAN, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented a certain new and useful Improvement in Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention has relation to looms of that class in which replenishment of the working weft-supply is effected automatically by the mechanism of the loom when necessity arises therefor—as, for example, on exhaustion of the supply of weft or filling that is carried by the working shuttle on the lay or on exhaustion thereof to a predetermined extent or on loss of continuity of such weft or filling, the action of the replenishing instrumentalities being brought about or instituted through the agency of suitable forms of weft-indicator mechanism.

More especially the invention has relation to automatic weft-replenishing looms of the type in which the speed of the loom is reduced during the performance of the operations which are incident to the weft-replenishment and afterward is restored to its normal rate. A loom of this type is presented in Letters Patent of the United States No. 626,834, granted to me June 13, 1899, to which reference may be had.

In the loom of Letters Patent No. 626,834 aforesaid I provided means under the control of the devices which institute the action of the replenishing instrumentalities whereby when the change of weft or filling is required to occur the driving of the loom first is modified to reduce the speed of the loom below that normally maintained during the regular working of the loom to a rate at which the operation of the replenishing instrumentalities conveniently and safely may be caused to take place and whereby, further, the picking of the shuttle is arrested, the reduction of the speed of the loom being maintained and the picking of the shuttle being arrested during several revolutions of the crank-shaft.

In my present invention the action of the picking mechanism is not arrested when the speed of the loom is reduced for the performance of the replenishing operations, the said mechanism being maintained in regular work-

ing relations, so that it continues to act in its regular timing with respect to the other working parts of the loom.

The invention consists, essentially, in a loom comprising, in combination, automatic weft-replenishing instrumentalities, speed-changing devices for the driving mechanism of the loom, and spring picking mechanism operating with uniform propelling force regardless of variations in the speed of the loom.

The invention will be described with the aid of the accompanying drawings, in which—

Figure 1 is an elevation of the change end of a loom on the order of that to which my invention is to be applied in practice. Fig. 2 shows in front elevation certain portions of the said loom, illustrating the application of one embodiment of my present invention. Fig. 3 shows in rear elevation certain portions of the said loom also illustrating the said embodiment.

Having reference to the drawings, *a a* designate the end frames of a loom, and *d* the lay thereof. One of the picker-sticks is shown in Fig. 1 at *o*⁹. In Fig. 1 one of the lay-pitmen or connecting-rods is shown at *d*¹², and *b* is the crank-shaft. *b*², Figs. 2 and 3, is the brake or balance wheel thereon, *c* the cam-shaft, and *c'* the gear on the cam-shaft in mesh with the pinion *b'* on the crank-shaft.

By way of making clear the relations, &c., of my present invention I will now describe, briefly, certain features of an automatic weft-replenishing loom of the type aforesaid.

My invention is not restricted to use in connection with replenishing instrumentalities of the particular character or arrangement herein shown and referred to, although in practice I prefer to employ shuttle-changing mechanism of the same general class as that which is shown and described in my Letters Patent aforesaid.

The instrumentalities which I have chosen to illustrate for the purpose of the present case are arranged to effect replenishment of the working supply of weft or filling by ejecting from the lay the spent or failed working shuttle and substituting a reserve shuttle from a hopper or magazine *e*. The latter is shown mounted independently of the lay at one end of the breast-beam.

In Fig. 1, f designates the working shuttle on the lay. Reserve shuttles are shown in dotted lines in the hopper or magazine e .

j is the injector or pusher for transferring at the proper time a shuttle from the said hopper or magazine e over into the shuttle-box on the corresponding end of the lay.

j' is the arm on which the injector or pusher is mounted, and j^2 is the pivot of said arm, the said pivot being applied to the corresponding end frame of the loom.

h is the vertically-movable front wall of the shuttle-box at the supply end or change end of the loom. h' is the rocker to which the said front wall is connected, and h^2 the pivot of the said rocker on a suitable support carried by the lay.

h^3 is the spring which acts to hold the rocker and front wall h in their normal position (represented in Fig. 1) and to return them thereto after the rocker has been moved to raise the said front wall.

In Fig. 1, g is the swell or binder, located at the rear of the shuttle-box, and g' the usual protector-finger acting against the said swell or binder and mounted upon a rearwardly-extended portion of the protector-shaft g^2 .

g^3 is the rocker, mounted upon the lay and having an arm in engagement with the said rearwardly-extended portion of the protector-shaft, by means of which the protector-shaft is rocked at the proper time to take the pressure of the protector-finger g' off the swell or binder g , as deemed advisable in some cases for the purpose of facilitating the movement of the front wall h of the shuttle-box and the entrance of a reserve shuttle into the shuttle-box under the action of the injector j .

i designates the ejector for pushing the spent or failed shuttle out of the shuttle-box after the movable shuttle-box front h has been raised out of the way, the said ejector being in the form of a plate working beneath the lower edge of the swell or binder g .

i' is the rocker for actuating the ejector, it being pivoted at i^2 to a support carried by the lay. One arm thereof is in connection with the ejector. A spring i^3 , acting on rocker i' , serves to hold the ejector in its rearwardly-retracted position.

m is the change-shaft, located at the rear of the loom and carrying the cams h^6 , g^7 , i^6 , and j^5 , by means of which are actuated the rocker h' , carrying the shuttle-box front h , the rocker g^3 , acting on the protector-shaft, the rocker i for the ejector, and the injector j . The bell-cranks which are engaged by the said cams, respectively, are designated h^5 , g^6 , i^5 , and j^4 , respectively. The connections which extend from the said bell-cranks to the various rockers and the injector-arm j' are designated, respectively, h^4 , g^4 , i^4 , and j^3 . The direction-changing pulleys or sheaves, around which connections h^4 , g^4 , and i^4 pass, are indicated at g^5 . The spring which is included in the connection between bell-crank j^4 and the injector is shown at j^6 .

In some respects the instrumentalities which have just been described differ from those of my Letters Patent No. 626,834 aforesaid and resemble those which are shown and described in Letters Patent No. 637,113, granted to me November 14, 1899.

I have shown herein the change-shaft m arranged to be driven from the cam-shaft c by the aid of power-transmitting connections substantially such as in my Letters Patent No. 637,113, the same comprising a sprocket-wheel m' , fast on the change-shaft, a sprocket-wheel m^3 , loose on the cam-shaft, a sprocket-chain m^2 , connecting the said sprocket-wheels, a clutch-disk m^7 , having a single clutch-tooth m^6 and fast with the cam-shaft, driving-arm m^5 , fast with the sprocket-wheel m^3 , and a clutch-dog m^4 , pivoted on said driving-arm. As disclosed in said Letters Patent No. 637,113, when the engaging end of said clutch-dog is permitted to be moved by spring m^8 into the path of rotation of clutch-tooth m^6 on disk m^7 the sprocket-wheel m^3 becomes clutched to the cam-shaft and is rotated, so as to transmit movement to the change-shaft m . As in my said Letters Patent No. 637,113, the clutch-dog is held normally out of the path of clutch-tooth m^6 by means of the disengaging-bolt n , the latter being forced against the tail of the clutch-dog by the projections n^5 n^5 n^5 , respectively, on the cam-disk n^3 , but being retracted from the tail of the clutch-dog by the spring n^2 when the projections n^5 n^5 n^5 are out of the way. The ratchet-wheel connected with cam-disk n^3 is designated n^6 . The actuating-pawl therefor is designated n^7 . The arm carrying said pawl is shown at n^8 , and the detector rock-shaft, on which said arm is mounted, is shown at n^9 . The spring which holds the free end of the pawl n^7 pressed into contact with the teeth of ratchet-wheel n^6 is marked n^{13} . The working of these parts last referred to is as set forth in my Letters Patent No. 637,113 aforesaid.

The devices for driving the loom and for varying the speed thereof, whereby the said speed automatically is reduced for the performance of the weft-replenishing operations and afterward is restored for the resumption of the normal working of the loom, are herein as in my prior patents, Nos. 626,834 and 637,113, aforesaid. They are shown in Figs. 2 and 3 of the drawings hereof. They comprise fast-speed driving-band r^4 , the usual fast and loose band-pulleys r^5 and r^6 , respectively, on the crank-shaft b for coöperation with the said fast-speed driving-band r^4 , the belt-shifter r^2 for controlling the position of the said band r^4 , the spring r^3 , acting upon the said belt-shifter r^2 with a tendency to hold the band r^4 on the band-pulley r^5 , the slow-speed driving-band s^4 , the supplemental fast and loose band-pulleys s^5 and s^6 on the crank-shaft b for coöperation with the slow-speed driving-band s^4 , the belt-shifter s^2 , controlling the position of the said slow-speed driv-

ing-band, the spring s^3 , acting on the said belt-shifter s^2 with a tendency to hold the slow-speed driving-band s^4 on the pulley s^6 , and the cam-disks r and s on the change-shaft m , acting in connection with arms r' and s' , with which the belt-shifters r^2 and s^2 , respectively, are provided. The usual shipper-handle for use in stopping the loom by hand when required is shown at u in Fig. 2.

In the loom of my Letters Patent No. 626,834 the picking is suspended by discontinuing the working of the picker-stick at the change end of the loom when the speed of the loom is reduced for the performance of the replenishing operations, and it is not resumed until the speed of the loom has been restored to its normal rate after such performance. The same statement applies in connection with the mechanism of my Letters Patent No. 637,113.

In my present invention I do not suspend the picking, but instead continue the picking mechanism in its action uninterruptedly. The picking mechanisms which I have shown and described in my prior patents are of characters in which the strength of the pick varies according as the speed of the loom varies, and consequently are unfitted for my present purposes. In reducing my present invention to practice I utilize picking mechanism which gives a pick of uniform strength regardless of the speed at which the loom is being run—in other words, picking with the same force at low speed as well as at high speed—and I permit the same to continue in operation while the loom is running at reduced speed and the replenishing operations are being performed. I utilize for propelling or picking the shuttle elastic power which is stored up by the action of some moving part in the loom—as, for instance, a cam—and then at the proper moment is released and permitted to actuate the shuttle. Hence the shuttle will always be propelled with the same initial energy whether the loom is running at normal speed or at reduced speed.

In the drawings I have shown the picker-sticks $o^9 o^9$ connected by lug-straps $o^8 o^8$ with arms $o^7 o^7$, fast on rock-shafts $o^6 o^6$, which last are suitably mounted in bearings on the end frames $a a$ of the loom. The said rock-shafts are furnished with other arms $o^5 o^5$, carrying pins or rollers $o^4 o^4$, bearing against the side faces of cams $o^3 o^3$, which are fast on the cam-shaft c . As the cam-shaft revolves the said side faces of cams $o^3 o^3$ act against the pins or rollers $o^4 o^4$ on arms $o^5 o^5$ to partially rotate the rock-shafts $o^6 o^6$ on their axes, thereby permitting or causing the picker-sticks to move outwardly along the shuttle-boxes on the lay. Each rock-shaft o^6 has connected therewith a spring, as p , Fig. 1, the said springs being put in a state of tension by this action of the said cams $o^3 o^3$, and consequently when the drop at o^2 of either cam presents itself to the corresponding pin or roller the corresponding spring p is free to act, and

it immediately rotates its rock-shaft in the reverse direction, the energy which has been stored up in the spring thus serving to actuate the picker-stick, which is connected with said rock-shaft, in a manner to throw the shuttle, as will be understood.

It will be obvious that the spring picking mechanism will act as efficiently during the slow-speed running of the loom in propelling a shuttle from one shuttle-box fully home into the opposite one as it will while the loom is being run at fast speed. This enables any required number of picks to be made with safety with the shuttle, whether failed or wholly or partially spent, after the speed of the loom has been reduced before the said shuttle is ejected from the lay and a reserve shuttle substituted therefor or any required number of picks to be made with the fresh shuttle after replenishment has been effected before the loom is speeded up again.

In practice the ejection of the spent or failed shuttle will of course be effected from the shuttle-box at the change end of the loom and before the time of a pick from that end, while the introduction of a fresh or reserve shuttle from the hopper into the said shuttle-box will be effected at about the time when the picking mechanism acts at the opposite end of the lay. For the purpose of insuring that the picker-stick at the change end of the loom shall not interfere with the operation of discharging a spent or failed shuttle or obstruct the entrance of the fresh or reserve shuttle the acting face of the cam o^3 is shaped, as shown, to return the picker-stick to its outermost position in the shuttle-box promptly after the pick from the change end of the loom and to hold it there during a period sufficient to provide amply for either the ejection of a spent or failed shuttle or the introduction of a fresh or reserve one.

In order that the ejector or injector may not be struck by the picker-stick, the cams by which the same are actuated are shaped to occasion a quick withdrawal of each of such parts after having been advanced into the shuttle-box.

I do not limit myself to the precise form of spring picking mechanism that is herein shown and described and in some cases contemplate the utilization of the elasticity of compressed air or the like.

I claim as my invention—

1. In a loom, in combination, weft-replenishing instrumentalities, fast and slow speed driving devices, means in operative control of said instrumentalities and devices to bring about replenishment of the working weft-supply during a temporary decrease in the speed of the loom, and spring picking mechanism.

2. In a loom, in combination, weft-replenishing instrumentalities comprising essentially a movable shuttle-box side, an ejector, and an injector, fast and slow speed driving devices, means in operative control of said instrumentalities and devices to bring about

replenishment of the working weft-supply during a temporary decrease in the speed of the loom, and spring picking mechanism.

3. In a loom, in combination, weft-replenishing instrumentalities, fast and slow speed driving devices, a change-shaft in operative control of said instrumentalities and devices to bring about replenishment of the working weft-supply during a temporary decrease in the speed of the loom, and spring picking mechanism.

4. In a loom, in combination, weft-replenishing instrumentalities comprising essen-

tially a movable shuttle-box side, an ejector, and an injector, fast and slow speed driving devices, a change-shaft in operative control of said instrumentalities and devices to bring about replenishment of the working weft-supply during a temporary decrease in the speed of the loom, and spring picking mechanism.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY I. HARRIMAN.

Witnesses:

J. FOSTER SEARLES,
CHAS. F. RANDALL.