

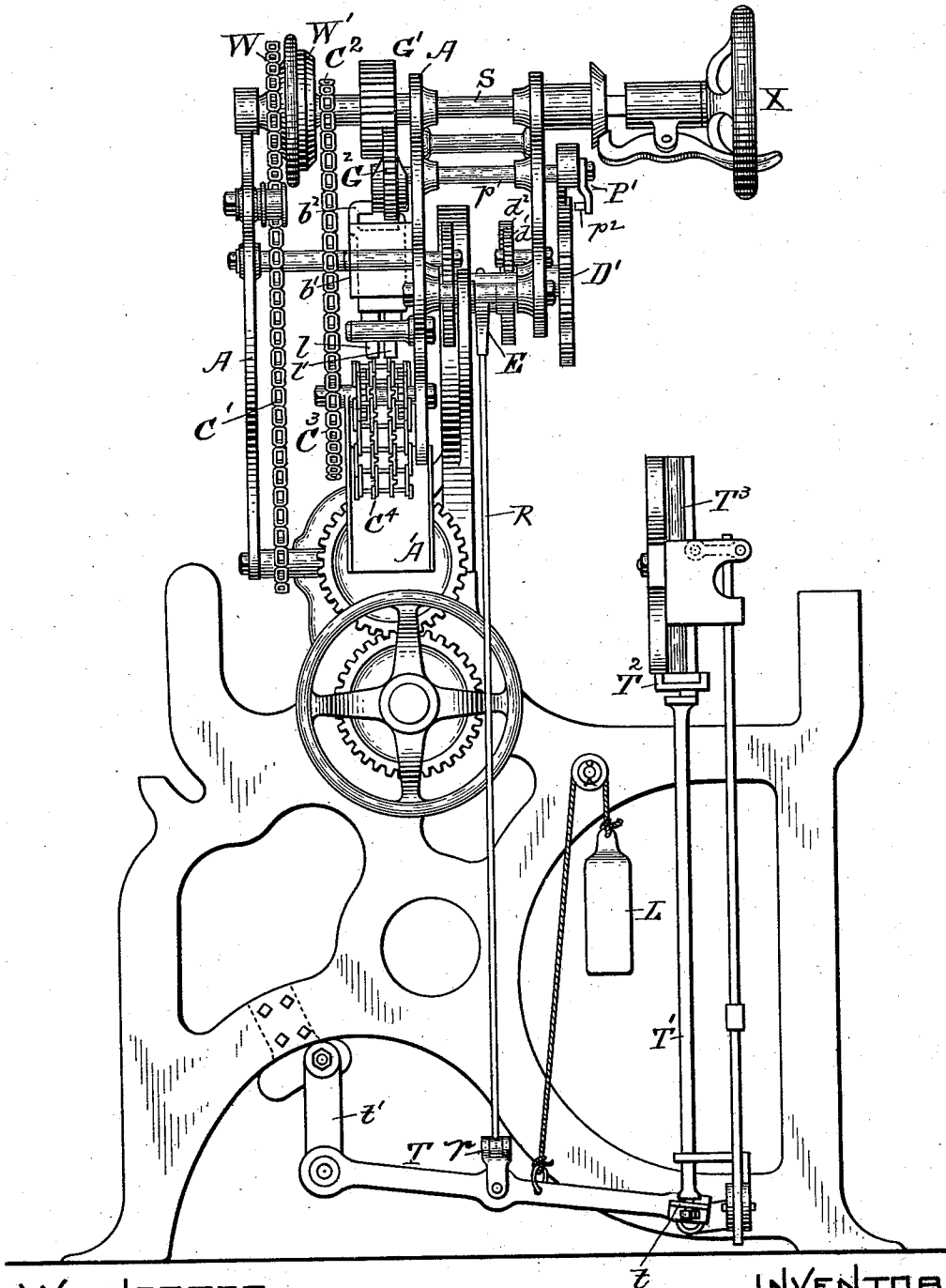
(No Model.)

7 Sheets—Sheet 1.

A. LUSCOMB.
SHUTTLE BOX MECHANISM.

No. 578,607.

Patented Mar. 9, 1897.



WITNESSES

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FIG. 1.

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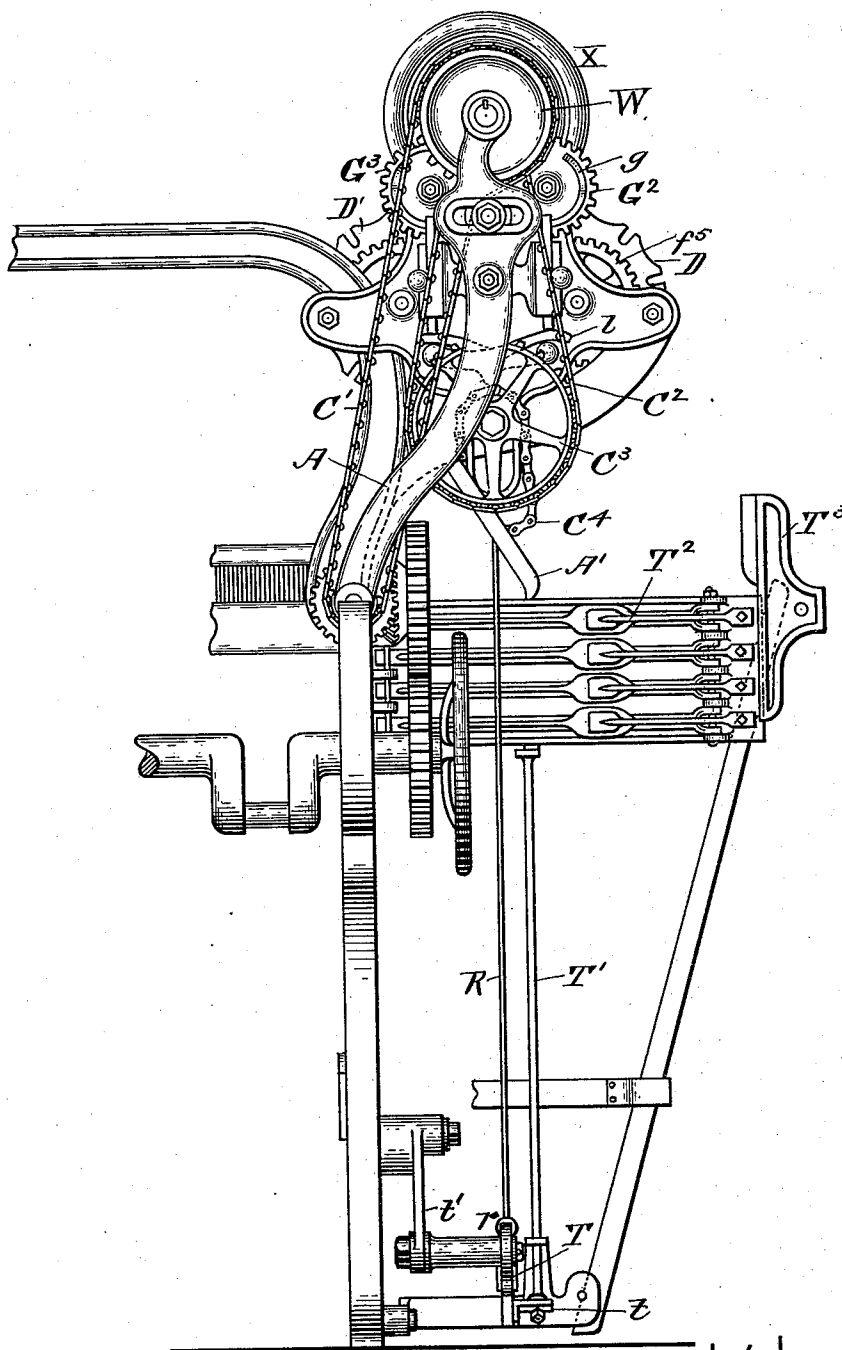
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A. LUSCOMB.
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FIG. 2. INVENTOR.
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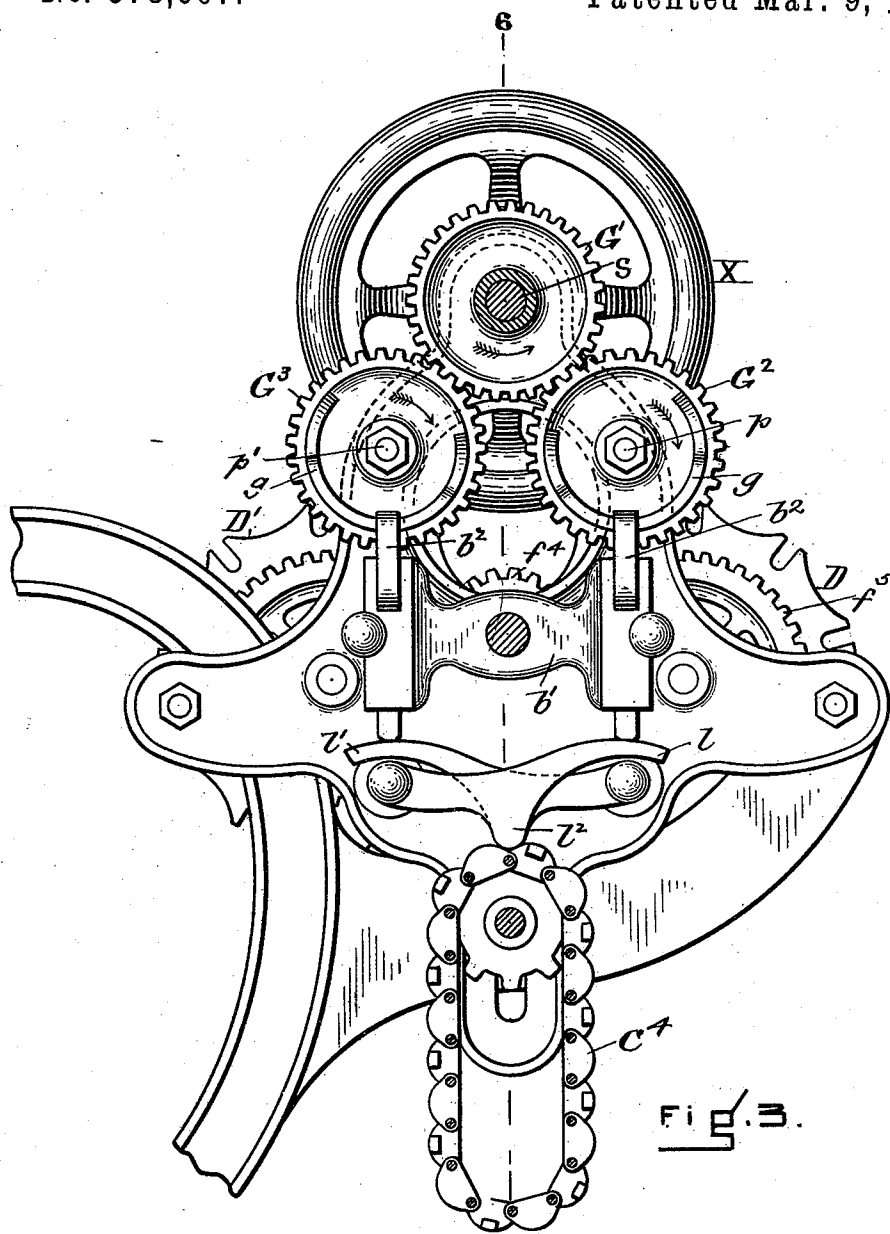


FIG. 3.

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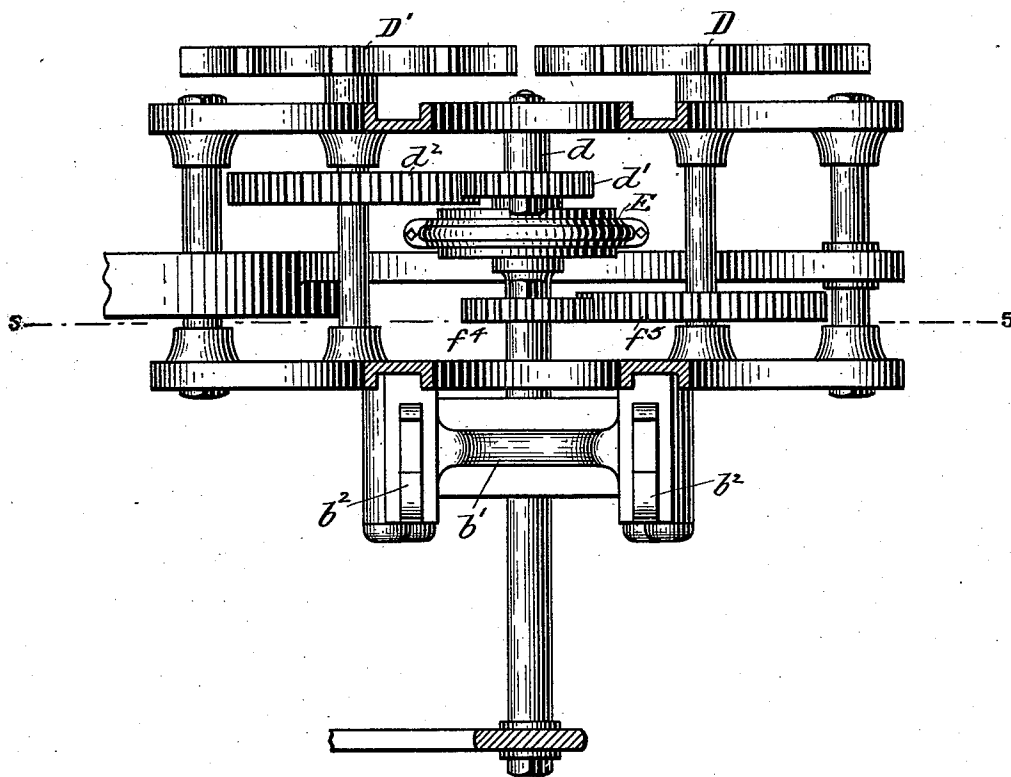


Fig. 4.

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(No Model.)

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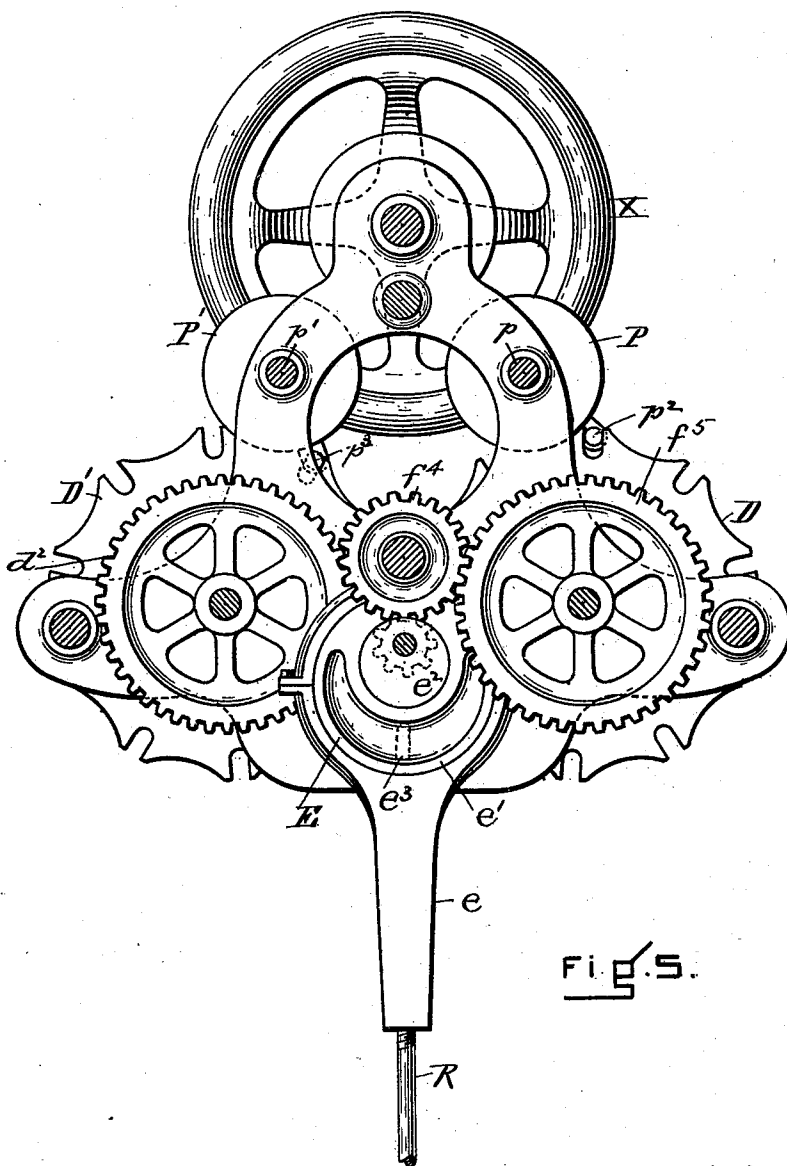


FIG. 5.

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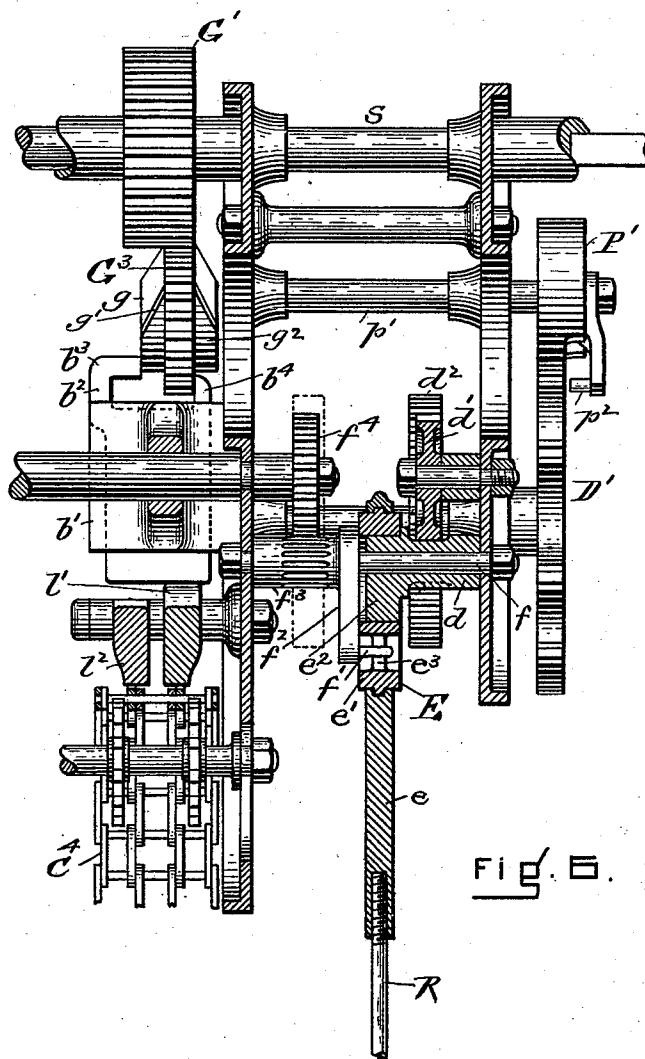


FIG. 6.

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Fig. 7.

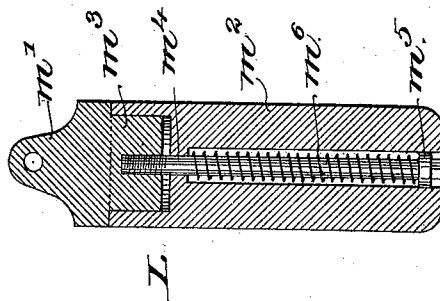
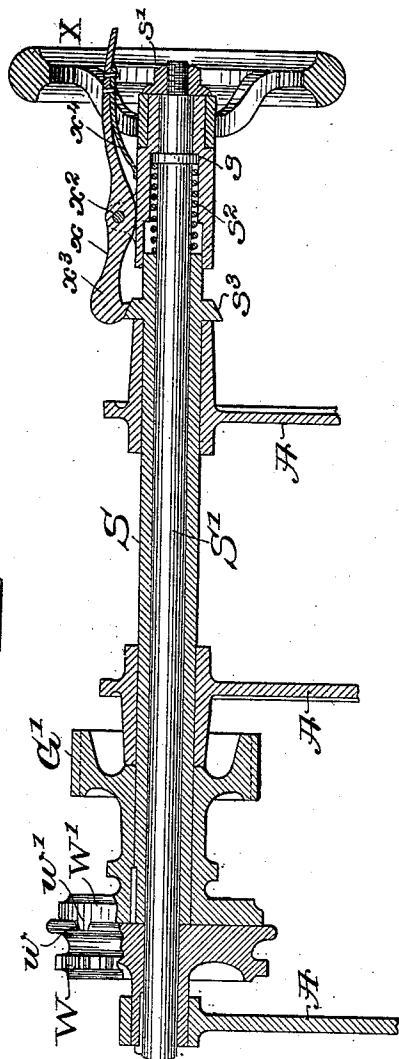


Fig. 8.

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UNITED STATES PATENT OFFICE.

ANDREW LUSCOMB, OF FALL RIVER, MASSACHUSETTS.

SHUTTLE-BOX MECHANISM.

SPECIFICATION forming part of Letters Patent No. 578,607, dated March 9, 1897.

Application filed June 17, 1896. Serial No. 595,866. (No model.)

To all whom it may concern:

Be it known that I, ANDREW LUSCOMB, a citizen of the United States, residing at Fall River, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Shuttle-Box Mechanism, of which the following is a specification.

This invention consists of a shuttle-box-operating mechanism for looms in which accurate and positive movement is imparted to the box or frame adapted to contain several shuttles which carry weft-threads of varied colors. The shuttle-box-operating mechanism contains devices, hereinafter to be described, which render the movement of the shuttle-box rapid and accurate and serve also to lock the shuttle-box in position in the line of the shuttle-raceway between any two successive movements.

In the drawings annexed to the specification, wherein like letters are used to represent like parts, Figure 1 is an end view of a loom, showing my shuttle-box-operating mechanism in side elevation. Fig. 2 discloses the shuttle-box-operating mechanism in end elevation, viewing the same from the back of the loom. Fig. 3 is an enlarged drawing which shows the selector devices of the shuttle-box-operating mechanism in end view, looking from the back of the loom. Fig. 4 is a top view of portions of the mechanism shown in Fig. 3. Fig. 5 shows the mechanism directly connected to the shuttle-box-lifting devices, and is a section along the line 5 5 of Fig. 4. Fig. 6 is a sectional drawing of the mechanism shown in Fig. 3, the section being taken along the line 6 6, looking toward the loom from its left-hand end. Fig. 7 shows in detail an automatic release and stop motion. Fig. 8 shows in detail a compound counterweight of which the office is to balance the weight of the reciprocating parts of the shuttle-box mechanism.

The shuttle-box T^2 , Fig. 2, is shown in the drawings as containing compartments for four shuttles, and the description herein relates to such a box, but it is obvious that a mere mechanical modification or reduplication of the device for raising and lowering the shuttle-box will enable that invention to be applied to shuttle-boxes of more or less than four compartments.

The shuttle-box T^2 , Fig. 1, is firmly secured to a rod T' , which fits loosely at its lower end in the shoe t on the free end of the lever T . A rod R is joined by a flexible joint r to the lever T and forms the connection between the lever T and the compound eccentric E , to be described more in detail in connection with Figs. 5 and 6. The lever T is flexibly connected to the frame of the loom by a link l' .

The counterweight L , Fig. 1, serves to compensate for the weight of the shuttle-box and its connected parts.

The weight of the moving parts of the shuttle-box movement is counterpoised by the weight L (seen in Fig. 1) in its relationship to the other parts of the mechanism. While the presence of the counterweight relieves the loom mechanism from the shocks and strains due to uneven loads, the inertia of the machinery remains an obstacle to be overcome, and the addition of every part increases this inertia and gives the actuating mechanism more to do. In order to cushion the jolt of starting or stopping the shuttle-box movement, the counterweight L is made in two spring-connected parts, so that the shock of sudden movement is distributed and diminished. This counterweight L is shown in detail in Fig. 8, and consists of two parts m' m^2 , held together by a rod m^4 , which is controlled by a spring m^6 . The upper portion m' of the counterweight is turned down to a cylindrical projection m^3 , which fits in a socket of corresponding dimensions at the top of the part m^2 of the counterweight. Into the part m^3 is screwed the rod m^4 , which passes into the hole in the lower portion of m^2 , in which the enlarged head of rod m^4 is fitted to slide. Spring m^6 holds the two parts of the counterweight together in such a manner that whenever the counterpart is lifted or dropped suddenly the jolt of the movement is in part taken up by the yielding of the spring m^6 .

The nature of the compound eccentric E is seen by examination of Figs. 5 and 6. The rod R is screwed into the tongue of the eccentric-strap e , which embraces the outer eccentric e' , which in turn embraces and serves as a strap for the inner eccentric e^2 .

The throw of eccentric e' is twice that of the eccentric e^2 , so that if the throw of eccen-

tric e^2 be regarded as the unit of the throw of the compound eccentric E the rod R may be lifted either one, two, or three units, according to whether either or both of eccentrics e' and e^2 are employed. The unit of throw is that which corresponds to a movement of the shuttle-box sufficient to shift it one shuttle-space.

Eccentric e^2 is integral with or screwed to the sleeve d , which rotates on the stud f as a bearing. In the sleeve d are cut gear-teeth which mesh with the pinion d' , which in turn is driven by gear-wheel d^2 , fast on the shaft, which is actuated by star-wheel D'. (See Fig. 4.)

The eccentric e' is slotted at e^3 , and within that slot plays the pin f' , integral with or secured to the crank-plate f^2 , which forms an extension of the sleeve f^3 , which, like the sleeve d , turns on the rod f .

The sleeve f^3 is geared to mesh with the pinion f^4 , which in turn meshes with the gear-wheel f^5 , which is actuated by the star-wheel D.

Each of the trains of gears actuated by star-wheels D and D', respectively, is designed to give the eccentrics e' and e^2 exactly one hundred and eighty degrees of revolution, so that each turn consequent upon the passage of one segment of the star-wheel will result in giving the eccentric its maximum throw.

As eccentric e' has an amplitude of throw twice that of eccentric e^2 , the resultant throw of the two eccentrics may be made to be either one, two, or three units, either up or down. If, for instance, eccentric e^2 is at the uppermost position of its throw and eccentric e' at its lowermost position and it is desired to move the shuttle-box system another unit of throw upward, simultaneous movement of the two trains of gears connected, respectively, with star-wheels D and D' will result in the desired movement, eccentric e' moving two units up, while eccentric e^2 moves one unit down, subtracting its unit from the two of upward throw of eccentric e' .

The normal position of the system as shown in the drawings is the one in which the uppermost compartment of the shuttle-box T² is in line with the shuttle-raceway. The three other possible positions of the shuttle-box are secured by movement of the compound eccentric E. Determination of the movements of the compound eccentric E is secured by the following-described mechanism:

The intermittent movement of star-wheels D and D' is secured by the agency of pin-wheels P and P', mounted, respectively, on shafts p and p' , which shafts are adapted to slide longitudinally in their bearings in the machine-frame. At the left-hand end of shafts p and p' , viewing the machine as in Figs. 1 and 6, are shipper cam-wheels G² and G³, Fig. 3. The wheel G² and its duplicate G³ are spur-gears meshing with the spur-gear G' and having upon their faces flange-cams g . The wheels P P' are driven from

the main shaft of the loom through the train of mechanism consisting of the chain C', wheel W, and its shaft S, on which the spur-gear G' is keyed. This gear meshes with gears G² and G³ on shafts p p' .

The rotation of the pin-wheels is continuous and their operation upon star-wheels D D' determined by the lengthwise movement of the shafts p p' . This movement is determined by the operation of the shippers b^2 , which operate on the cam-flange g by means of the finger b^3 and thumb b^4 , Fig. 6. The shippers b^2 consist of plates sliding in boxes which form integral parts of the yoke b' , Figs. 3 and 4. The lower ends of shippers b^2 extend through the boxes on b' and rest upon the ends of lifting-levers ll' . These lifting-levers are provided with toes l^2 , which rest upon the links of a pattern-chain C⁴. This pattern-chain C⁴ is moved at a uniform rate by means of the chain C² and wheel C³, Fig. 1. An apron A' is provided, which insures a proper disposition of the slack loop of pattern-chain C⁴ when the latter is unusually long. Through levers ll' , operated by the links of pattern-chain C⁴, the shippers b^2 are raised or lowered. The movements of the pattern-chain C⁴ are timed so that the movement of the shipper up and down shall occur when the cam-flange g is making the upper half of its revolution. The finger and thumb b^3 and b^4 are so proportioned and disposed (see Fig. 6) that a movement of the shipper b^2 must result in a movement of shaft p' either to the right or left.

Viewing the machine as in Fig. 6, it is obvious that a movement of shaft p' to the left will result in the engagement of star-wheel D' by pin-wheel P' and a consequent movement of the eccentric-rod R through the train of gears hereinbefore described. To effect this movement, let the lever l' be raised by a lug on pattern-chain C⁴. Then the shipper b^2 will be pushed up into such a position that the thumb b^4 will upon the next half-revolution of the gear G³ come into operative contact with the cam-flange g^2 . This contact instantly throws the gear G³, shaft p' , and pin-wheel P' to the left. The gear G³ moves along the face of wheel G', which is made sufficiently wide to permit this movement and at the same time continue its work of driving the gears G² and G³ and their respective trains of mechanism. The longitudinal movement of shaft p' to the left brings the flange g' under the guide portion of finger b^3 , and so long as the shipper b^2 remains elevated the star-wheel D' is rotated intermittently with every revolution of pin-wheel P'. As the pin p^2 of pin-wheel P leaves the star-wheel notches the disk portion of P fits in the concave faces of the star-wheel sectors and locks the star-wheel between the intermittent movements of rotation. The same action takes place with pin-wheel P' and its pin p^3 . In order to throw star-wheel D' out of operation, the reversal of the mechanical movement just described

is effected by arranging the links of pattern-chain C' so that lever l' will drop and permit the shipper b^2 to rest in its normal position, as shown in Fig. 6. This movement, like the upward movement of lever l' and shipper b^2 , takes place when the flange-cams $g g$ are in the upper half of their revolution. The finger b^3 then operates to throw the gear G^3 and shaft p' with pin-wheel P' a sufficient distance to the right to throw the pin-wheel out of engagement with the star-wheel D' , the disk portion of the pin-wheel remaining in the corresponding face of the star-wheel segment and locking the same in position.

The above description relates only to one of the star-wheels and its train of operating mechanism, but is equally applicable to the others, these mechanisms being arranged in duplicate, as shown in Figs. 3, 4, and 5.

The compound eccentric E , consisting of two eccentric members, is capable of operating the shuttle-box having four compartments requiring four determined positions with relation to the shuttle-raceway.

Reduplication of the mechanism described in connection with either of the eccentric members $e' e^2$ and their respective actuating mechanism will render the shuttle-box-operating attachment capable of securing the requisite movement to a shuttle-box having more than four compartments or members. This reduplication is, however, only a matter of mechanical design and a compound eccentric consisting of only two members sufficiently discloses the nature and substance of the mechanism.

In connection with the shuttle-box-lifting mechanism there is provided means for throwing the box-motion out of connection with the main shaft of the loom. This disconnection may take place at the will of the operator who desires to manipulate the box-motion by hand, or automatically when some obstruction to the movement of the shuttle-box renders instant disconnection with the source of power necessary. The portion of the mechanism contrived to secure these results is shown in Fig. 7, which is a detail of Fig. 1.

The driving-shaft of the shuttle-box mechanism is made in two parts S and S' , the outer shaft S being capable of sliding along the inner shaft S' . The main driving-wheel W turns upon the inner shaft S' and is normally in engagement with the disk W' by reason of the interlocking of the tooth w' and the notch w in disk W' and wheel W , respectively. At the end of shaft S' remote from wheel W is mounted the hand-wheel X . The hub of hand-wheel X is bored out to receive the end of shaft S' , upon which is the collar s , which rests against a shoulder of the hub of wheel X . The nut s' screws the wheel and hub to the shaft S' . The hollow shaft S is inserted in the hub of wheel X , and in the space between shaft S' and the sides of the hole bored in the hub of wheel X is placed a coiled spring s^2 , which, bearing against the collar s at one end and

the end of hollow shaft S at the other, constantly exerts its bias to hold disk W against wheel W' . This thrust of spring s^2 holds the disk W' and wheel W normally in engagement with each other by means of the tooth and notch w' and w heretofore described.

The hollow shaft S has a collar s^3 preferably integral with it. The rim of collar s^3 is turned to a bevel or conical surface, so as to permit the claw x^3 of notch x to ride up when shaft S' is thrust to the left, as viewed in Fig. 7. A spring x^4 constantly presses the claw x^3 of catch x against the conical surface of collar s^3 . If the operator desires to turn the shuttle-box mechanism by hand, he has only to thrust the hand-wheel X toward the disk W' against the pressure of spring s^2 . The claw x^3 of catch x rides up over the collar s^3 until it catches on the back side of the collar. With the parts in this position the spring s^2 is locked out of action and the shaft S' is moved through the hollow shaft S until disk W' and wheel W are turned out of engagement. Then through the mechanism shown and described in connection with Fig. 1 the shuttle-box mechanism may be operated by hand. Likewise the mechanism of Fig. 7 is useful as an automatic release or stop motion whenever by chance the normal movement of the shuttle-box is interrupted or obstructed.

The sides of tooth w' and notch w are inclined at such an angle that while under normal operation the spring s^2 holds the tooth and notch w and w' in engagement with each other the interposition of an obstruction will increase the sliding tendency of the inclined sides of the said tooth and notch w' and w to such a point that the pressure of spring s^2 will be firm and the tooth w' be thrown out of notch w . This results in a lengthwise relative movement of the shafts S and S' , so that the claw x^3 of catch x hooks over the collar s^3 , holding the wheel W and disk W' out of engagement. In this position the mechanism is retained until the workman in attendance upon the loom can repair the damage or remove the obstruction.

I claim—

1. A shuttle-box-operating mechanism comprising the following instrumentalities in combination: shuttle-box supports and connections therewith to a compound shifting device consisting of a plurality of independently-movable eccentric members, each member by its movement contributing to the movement of the whole shifting device, the said members having each an actuating-train of mechanism and a selecting device adapted to throw the train into or out of action at periods predetermined by the said selecting device.

2. A shuttle-box-operating mechanism comprising the following instrumentalities in combination: shuttle-box supports and connections therewith to a compound shifting device consisting of a plurality of independently-movable eccentrics of diverse eccen-

tricity, each member serving as the eccentric-strap for the member next inferior to it in eccentricity, the connections with the shuttle-box supports being so arranged as to receive the resultant movement of the eccentric members, and means for independently actuating the said members.

3. A shuttle-box-operating mechanism comprising the following instrumentalities in combination: shuttle-box supports and connections therewith to a compound shifting device consisting of a plurality of independently-movable eccentrics, contained within and operating on an inclosing eccentric-strap, the said inclosing strap being connected with the shuttle-box supports, each eccentric member of the compound shifting device being actuated by connections with a train of intermittent gears, said train of gears being controlled with shipper mechanism whereby the train may be alternately thrown into and out of operation, and selectors designed and adapted to operate upon and actuate the said shippers at predetermined periods.

4. A shuttle-box-operating mechanism for a loom comprising the following instrumentalities in combination: a movable shuttle-box, its supports, said supports being connected with the straps of a compound lifting device which consists of a plurality of eccentrics, each independently movable on its axis and actuated by an intermittently-rotatable star-wheel, each star-wheel being controlled and operated by a pin-wheel mounted on a longitudinally-movable shaft rotating a cam on each of said shafts and a shipper operating in conjunction with the cam to move the shaft longitudinally, said longitudinal movement being designed and adapted to throw the pin-wheel into and out of mesh with the star-wheel, a pattern-chain and connections therewith to the shipper for operating the same, and connections whereby the pattern-chain is moved progressively in harmony with the mechanism of the loom.

5. A shuttle-box-operating mechanism comprising the following instrumentalities in combination: shuttle-box supports and connections therewith to a compound shifting device consisting of a system of independently-movable eccentrics, the said system of eccentrics operating on a common eccentric-strap, said strap being connected with the shuttle-box supports, each eccentric member of the system being actuated by connections with a train of intermittent gears, said train controlled by shipper mechanism whereby the train may be alternately thrown into and out

of operative mesh, automatic devices for locking each of said trains of gears simultaneously with the shipper movement which throws it out of mesh, and selective mechanism designed and adapted to operate upon and actuate the said shippers at predetermined periods.

6. In a loom the combination with a driving-shaft, of connections between said driving-shaft and shuttle-box-operating mechanism, said connections comprising the following instrumentalities in combination: two clutch members, the one rigidly connected with the driving-shaft, the other similarly connected with the train of shuttle-box mechanism; means for exerting pressure which holds the clutch members in clutch under normal conditions of operation, the said pressure being so adjusted that the application of an abnormal load on the shuttle-box mechanism will overcome the pressure and cause the clutch members to release their hold upon each other and automatic means for holding said members out of clutch after they have released their hold upon each other.

7. In a shuttle-box-operating mechanism a compound driving-shaft comprised of the following instrumentalities in combination: a driving-wheel in positive driving connection with the main shaft of the loom, said driving-wheel connected with clutch mechanism which constitutes the driving connection between the wheel and the shuttle-box mechanism, said clutch mechanism composed of two members normally held in mesh with each other by spring or other pressure, the interlocking mesh of said clutch members being provided with surfaces inclined to the direction of the driving pressure exerted through the clutch, the said pressure being adjusted to retain the clutch members in contact during normal operation of the machine and to yield whenever abnormal loads are put upon the driving mechanism by the shuttle-box mechanism and thus to permit the inclined surfaces of the clutch-mesh to slide by each other and throw the clutch members apart against the said pressure and automatic means for holding said members out of clutch after they have released their hold upon each other.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW LUSCOMB.

Witnesses:

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JONATHAN THAYER LINCOLN.