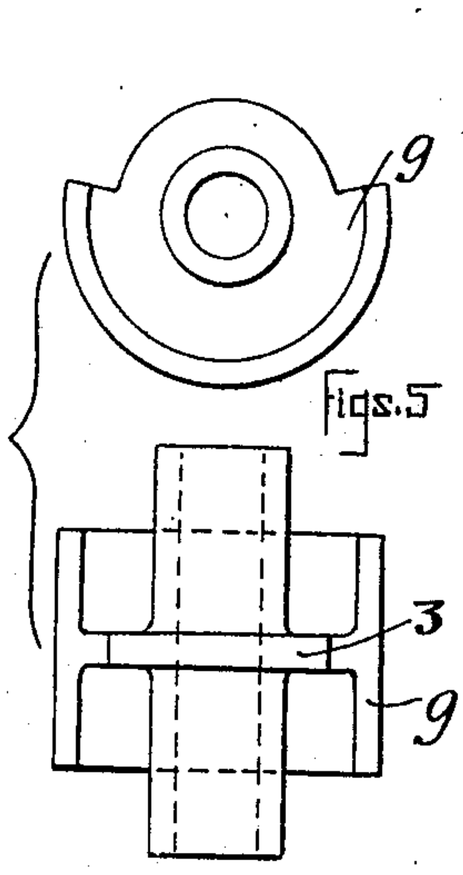
No. 865,649. PATENTED SEPT. 10, 1907.

F. LEEMING & C. HUDSON.

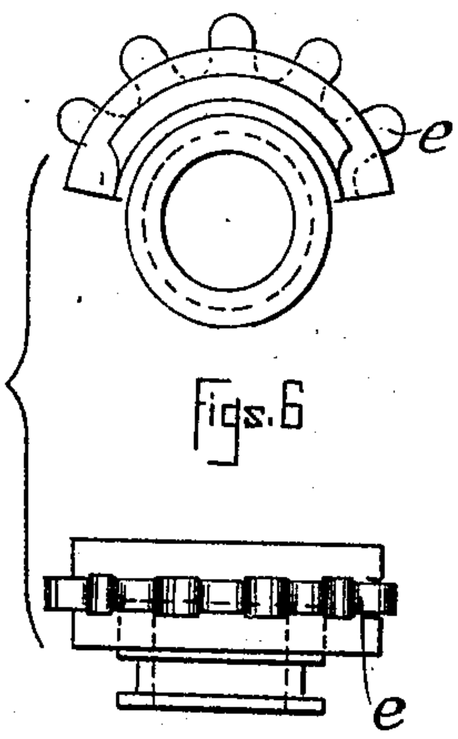
SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

APPLICATION FILED AUG. 28, 1905.

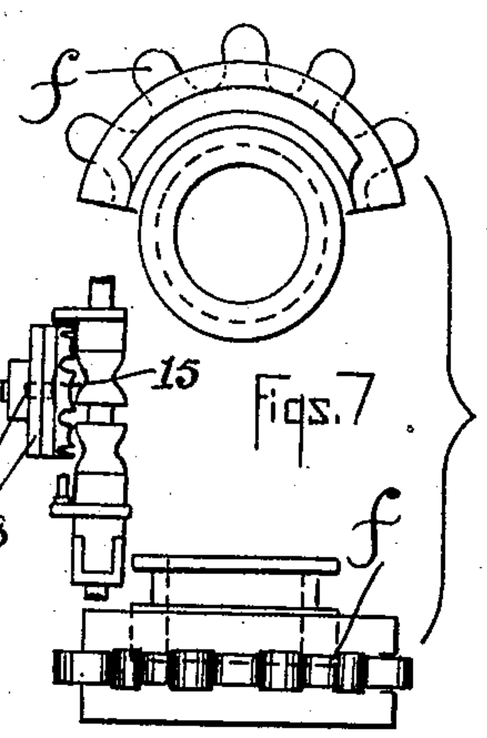
2 SHEETS—SHEET 1.



Figs. 5

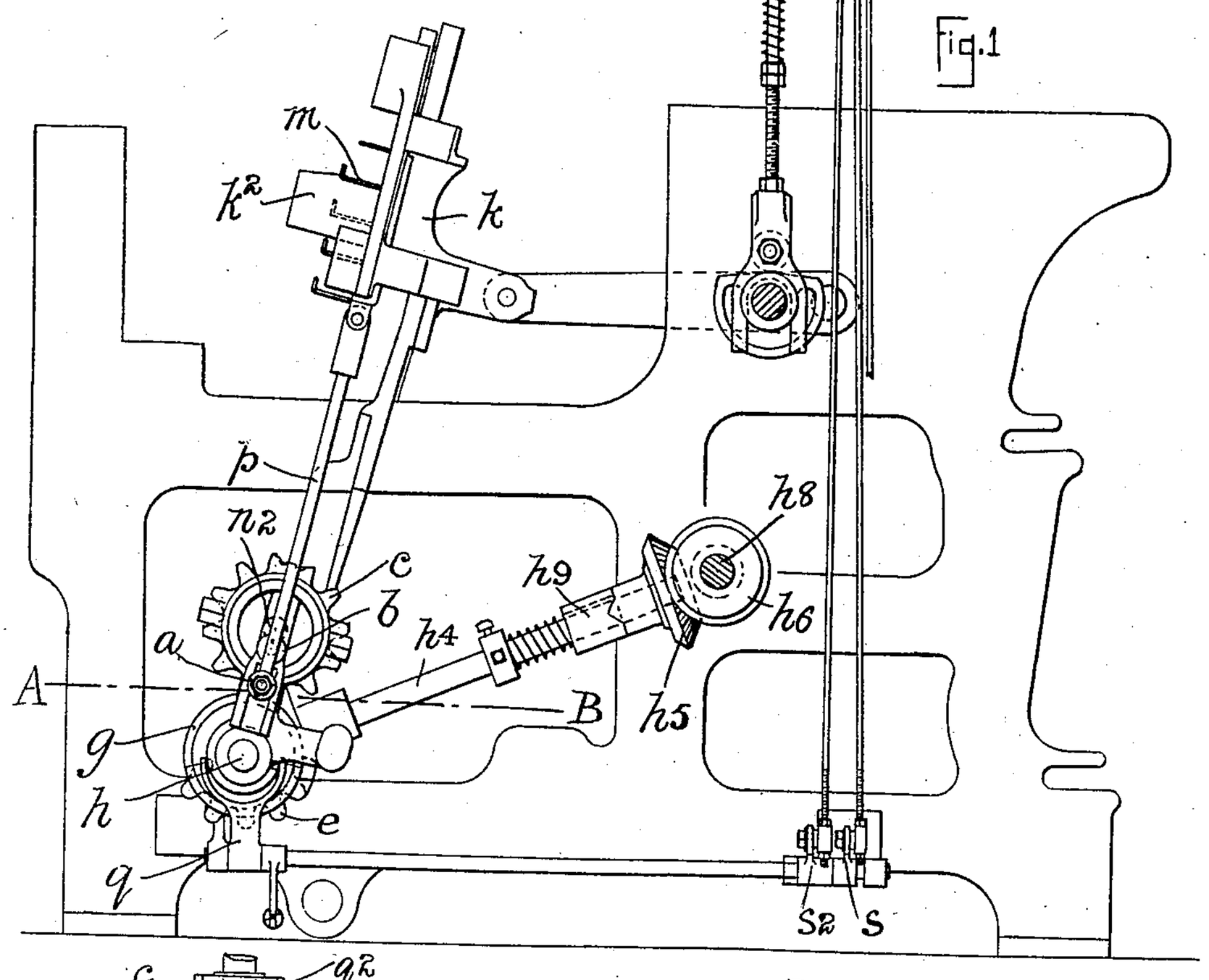


Figs. 6



Figs. 7

Fig. 1



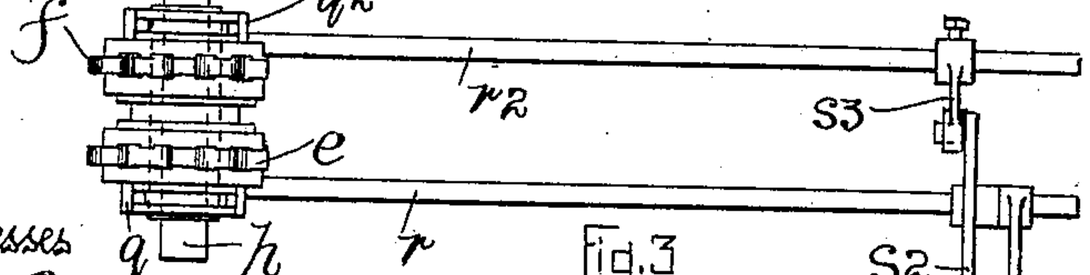


Fig. 3

Witnesses
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2 SHEETS—SHEET 2.

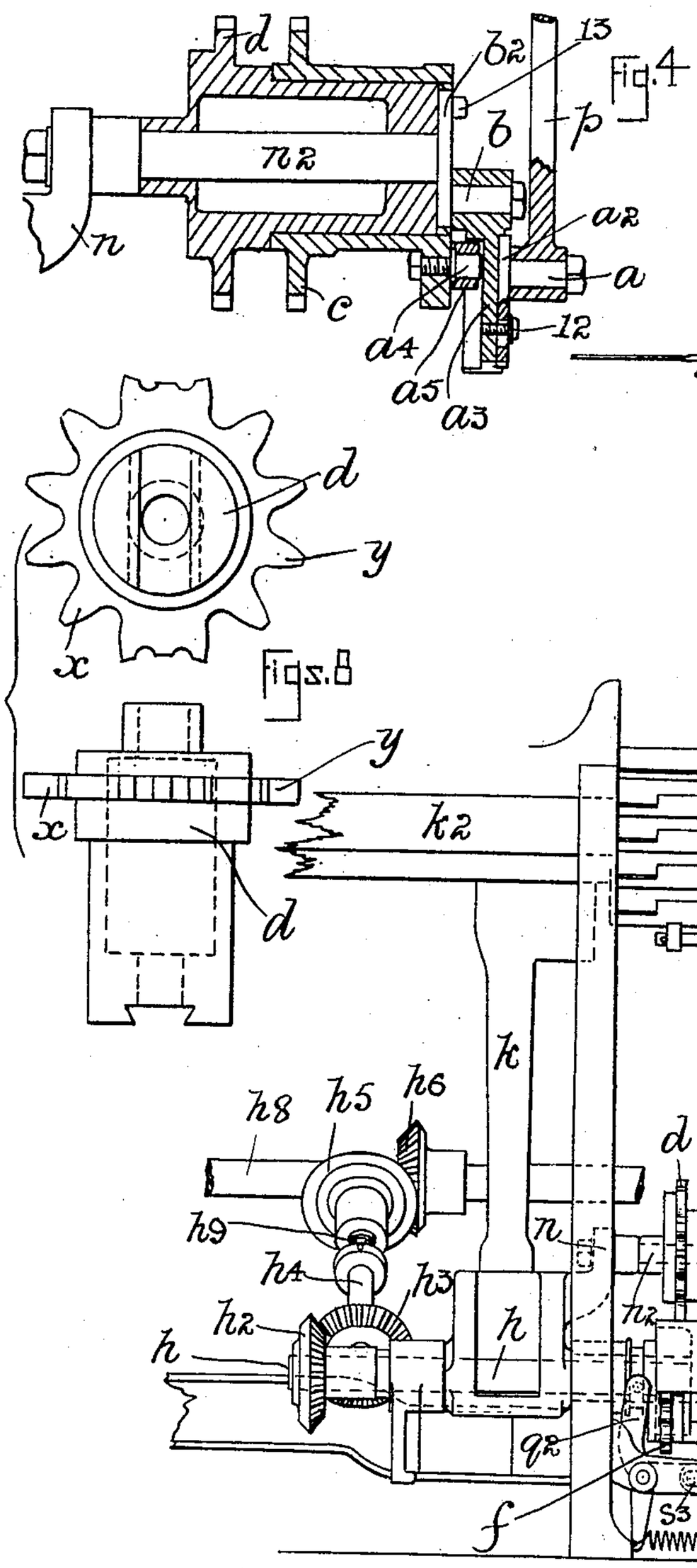
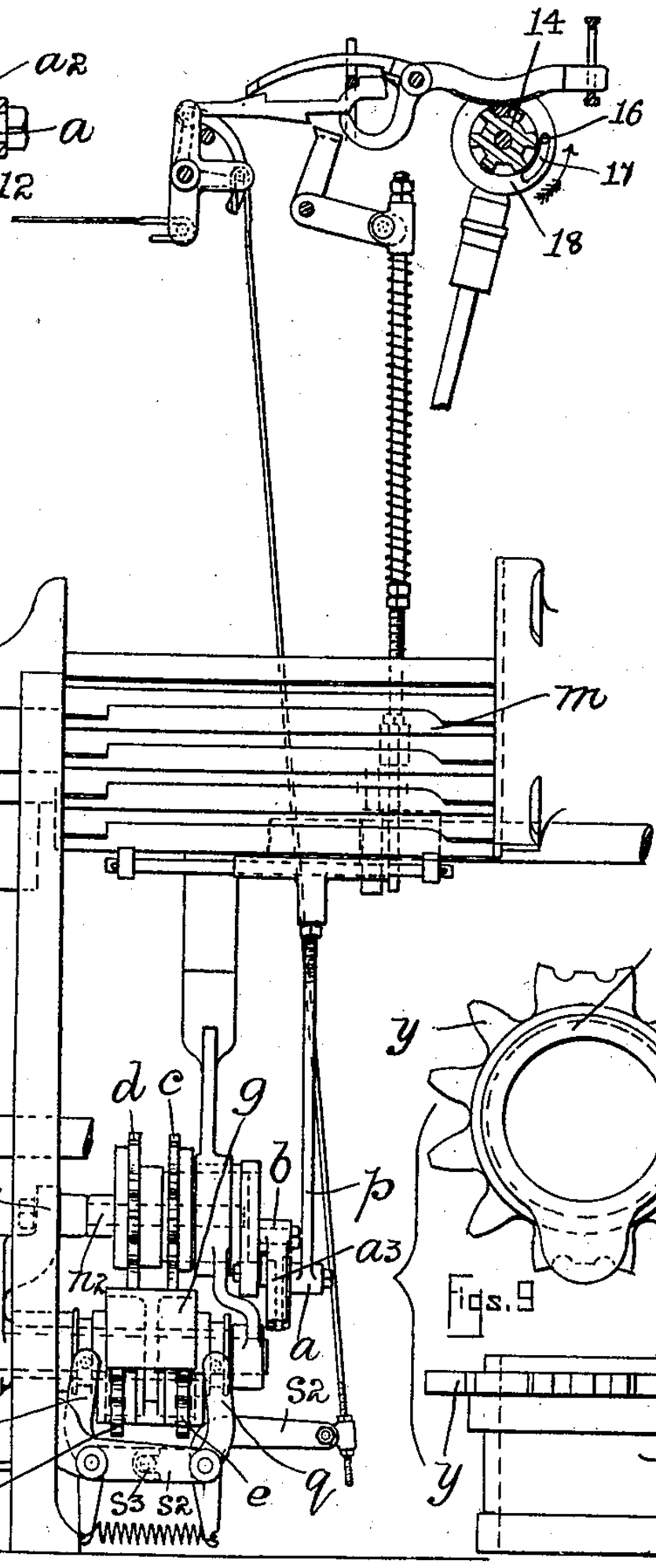


Fig. 4

Figs. 8



Figs. 9

Fig. 2

Witnesses
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UNITED STATES PATENT OFFICE.

FRANK LEEMING, OF BRADFORD, AND CHARLES HUDSON, OF INGROW, NEAR KEIGHLEY, ENGLAND, ASSIGNORS TO GEORGE HATTERSLEY AND SONS LIMITED, OF KEIGHLEY, ENGLAND.

SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

No. 865,649. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed August 28, 1905. Serial No. 276,010.

To all whom it may concern:

Be it known that we, FRANK LEEMING and CHARLES HUDSON, subjects of the King of Great Britain, and residents, respectively, of 15 Far Cliffe Terrace, Bradford, and 34 Broomhill avenue, Ingrow, near Keighley, both in the county of York, England, have invented certain new and useful Improvements in Shuttle-Box-Operating Mechanism for Looms, of which the following description, together with the several sheets of drawings, is a specification.

In shuttle-box operating mechanism of the class known as "rising and falling" or "drop-box" motions for looms, all the devices as heretofore constructed and employed have transmitted motion to said shuttle-boxes by means of parts that have oscillated with the lay or slayboard but about a different center to that about which said slayboard oscillates, with the result that it is almost impossible to adjust the series of shuttle boxes so that each one or any of them may be brought and held as required at all times when at rest relatively therewith, level or in line with said slayboard or the shuttle-race thereon as is desired for the accurate working or "boxing" of the shuttle therein.

To obviate these defects by the production of means whereby each or any one of the shuttle-boxes when desired to be brought into line with the shuttle race, may be so brought and there held or retained throughout all the path in which said shuttle-race oscillates, is the object of our present invention. To attain this object we make use of the devices illustrated by the accompanying sheets of drawings and as hereinafter described.

In said drawings, Figure 1 is an end elevation of a sufficient part of a loom to illustrate the application of our invention. Fig. 2 is front elevation of the parts shown by Fig. 1. Fig. 3 is a sectional plan or view as seen from above of certain parts shown by Fig. 1 below line A—B. Fig. 4 is a longitudinal section of the crank mechanism hereinafter described. Figs. 5, 6, 7, 8, and 9 are views showing in detail certain of the segment and partly toothed wheels employed as hereinafter explained. Figs. 4 to 9 inclusive are drawn to an enlarged scale as compared with the other figures. Similar letters and figures of reference indicate similar parts throughout the several views.

In carrying our invention into effect we make use of duplex cranks *a* and *b* which are respectively mounted upon (by parts hereinafter described) so as to rotate with the partly toothed wheels *c* and *d*, and to operate these wheels *c* and *d* we employ segment wheels *e* and *f* which are formed to slide upon the hub of a segment rim *g*, the part *e* being on one side of its central web while the part *f* is on the other side thereof.

The construction of the segment rim *g* and the arrangement of the wheels *e* and *f* relatively thereto will be understood by reference to Figs. 2, 3, 5, 6 and 7. The segment rim *g* is formed with a hub portion mounted upon the shaft *h*, said hub being longer than its cut away peripheral portion as shown on the lower part of Fig. 5. The segmental portion of said periphery is slightly more than one-half of a circle, and therefore when the hubs of the segment wheels *e* and *f* are slipped upon the hub portions of the segment rim *g*, the engagement of the edges of the segments *e* and *f* with the edges of the peripheral portion of the segment rim *g*, causes all of these parts to rotate in unison although the segment wheels *e* and *f* are free to be shifted longitudinally of the hub of the rim *g* without having the driving connection of the parts disengaged. This segment rim *g* together with its segment wheels *e* and *f* we mount upon the shaft *h* which carries the lay sword *k* and the lay or slayboard k^2 in connection with which the tier of shuttle boxes *m* have to operate.

By the bracket or supporting piece *n* and its shaft n^2 which are also mounted to rotate about the center of the shaft *h*, we are enabled to mount the partly toothed wheels *c* and *d* so as to gear with the segments *e* and *f* as hereinafter explained.

The crank *a* is mounted by the adjustable sliding piece a^2 upon the link a^3 which is caused to rotate about the crank *b* by the pin a^4 (carrying the antifriction bowl a^5) which is secured to the sleeve of the wheel *c*, taking within a groove or recess in the back of the link a^3. The crank *b* is fixed upon an adjustable piece b^2 secured to the end of the hub of the wheel *d*, and from the crank *a* the connecting rod *p* reaches and is coupled to so as to operate the shuttle-boxes *m*.

The shaft *h* is continuously rotated (when the loom is in action) by being coupled through or by the bevel gears h^2, h^3, shaft h^4 and bevel gears h^5, h^6 to the motor shaft h^8 of the loom. A spring pressed clutch coupling h^9 is mounted on the shaft h^4 so that provided from any cause the shaft *h* is held against rotation said spring will yield and its clutch will be thrown out of gear thus allowing the shaft h^8 to continue its motion without causing breakages in any of the parts. As the shaft *h* rotates so also will the rim *g* and its wheels *e*, *f* and as these latter are moved longitudinally upon this rim *g* into the paths of the two series of teeth *x* and *v* of the wheels *c*, *d* these latter will have rotary motion transmitted to them and so they will by their cranks *a*, *b* operate the shuttle boxes *m* as will be understood.

From the foregoing description it will be observed that as the lay k^2 oscillates about the center of the shaft h so also will the wheels e, f and that since their operating wheels c, d are also rotated about said shaft h the cranks and the parts they carry (including the shuttle boxes m) will always be relatively at rest with the lay k^2 at all times when the rotary motions of the cranks a, b are completed prior to the throwing or picking of the shuttle, hence each shuttle box when brought level or in line with the lay or shuttle race thereon is there retained firmly and securely as desired.

The adjustment of the several shuttle-boxes m to be in alinement with the lay k^2, is effected by the adjusting or sliding pieces a^2 and b^2 which are secured in position by the fixing screws 12 and 13 taking through slots therein.

Lateral motion is transmitted to the segment wheels e f by the forks q, q^2 mounted upon the shafts r, r^2 which are operated by the levers s, s^2 and s^3 deriving their motion from the pattern surface mechanism shown by Figs. 1 and 2. In looms of the class wherein a reversal of the direction of motion of said pattern mechanism is to be made use of for well known purposes since the usual form or arrangement of such mechanism would cause a disarrangement of same relatively with the order of the several shuttles in the shuttle boxes, we arrange the card or pattern cylinder 14 to be intermittently rotated by the usual crown wheel 15 but not by such wheel being coupled to or fixed upon its shaft but by arranging it to rotate freely thereon and with a projection 16 fixed upon it extending through the curved slot 17 in a disk 18 as said disk 18 is fixed on said shaft, when said projection reaches the end of the slot in either direction the wheel 15 will then commence to transmit its motion to the disk 18 and so to the cylinder 14. The length of the slot 17 is equal to the distance traveled by its pattern cylinder at each of its intermittent movements, consequently when the direction of motion of the wheel 15 is reversed the reverse movement of the disk 18 as also of the cylinder 14 is not commenced until after the first of such movements on the part of the disk 18 is finished and until the second movement of same is commenced, hence at such times the cylinder 14 rests or dwells and by which resting or dwelling of the cylinder 14 on such occasions time is allowed for the box operating mechanism to return and bring the shuttles in their proper order relatively with the pattern surface operated by the pattern mechanism.

Having now particularly described our said invention, what we claim is:—

1. In a loom, the combination with the lay, of shuttle-box operating mechanism mounted to oscillate on the center of movement of the lay, and means mounted to rotate about the center of movement of the lay to actuate said shuttle-box operating mechanism.

2. Shuttle-box operating mechanism for looms comprising a segment rim and wheels mounted to rotate about the center of oscillation of the slayboard, partly toothed wheels and bearings for supporting same also arranged to oscillate about the same center, means for putting said segment wheels into and out of gear with their partly toothed wheels and means for coupling same so as to transmit motion to the shuttle boxes substantially as herein specified.

3. In shuttle-box operating mechanism a segment rim and segment wheels means for transmitting motion thereto about the center of oscillation of the lay, partly toothed wheels gearing with said segment wheels, said partly toothed wheels being mounted in bearings which are arranged to move in the arc of a circle the center of which is the center of oscillation of the lay, cranks carried by adjustable pieces secured upon said partly toothed wheels and means for coupling said cranks to the shuttle-boxes substantially as herein specified.

4. In a loom, shuttle-box operating mechanism, devices for actuating said mechanism, said devices being mounted to oscillate on the center of movement of the lay, the said shuttle-box operating mechanism being also mounted to oscillate on the center of movement of the lay and in concert therewith, and yielding clutch mechanism for transmitting motion between said parts.

5. In a loom, shuttle-box operating mechanism, segment wheels and partly toothed wheels as herein described, pattern surface mechanism for placing said mechanism into and out of operation and means whereby the pattern cylinder of said pattern surface mechanism is caused to rest or dwell at each reversal in the direction of motion of its operating wheel substantially as herein specified.

In testimony whereof we have hereunto affixed our signatures in presence of two witnesses.

FRANK LEEMING.
CHARLES HUDSON.

Witnesses:
GEORGE PEARSON HOLMES,
JOHN WHITEHEAD.