

C. GAHREN.

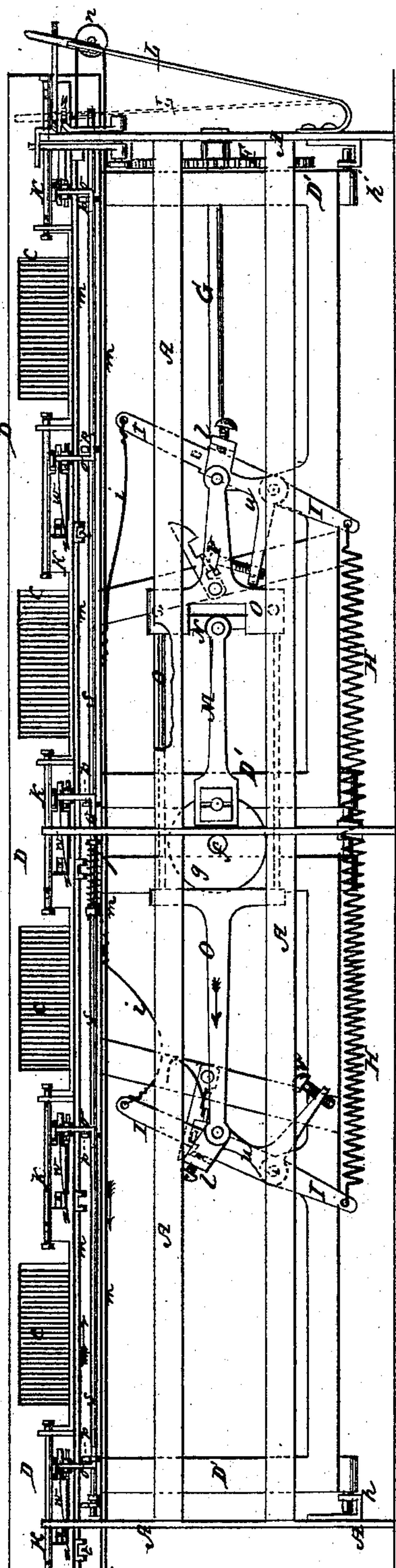
4 Sheets--Sheet 1.

Looms for Weaving Corsets, &c.

No. 154,035.

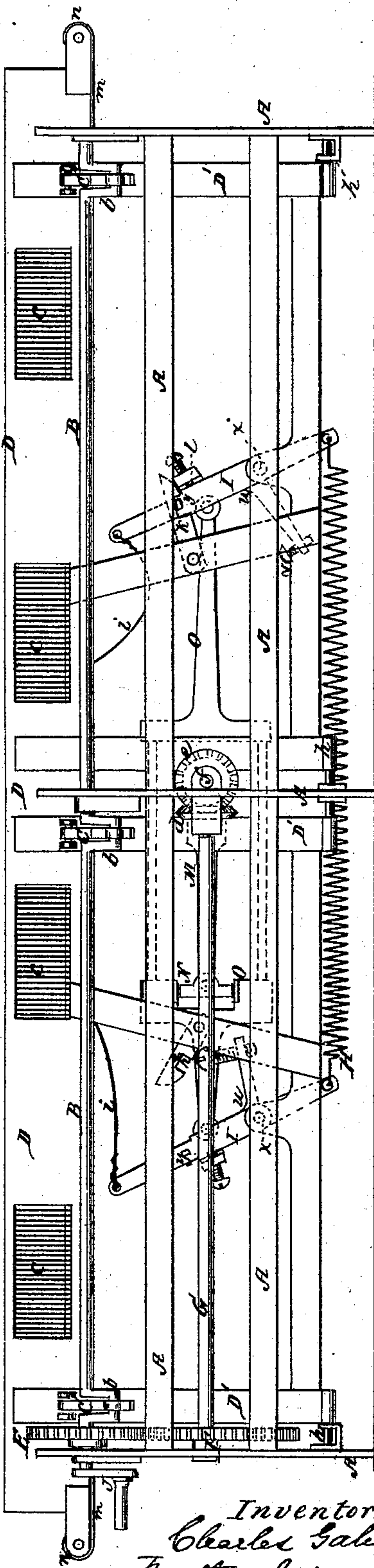
Patented Aug. 11, 1874.

Fig. 1.



Witnesses:
E. Wolff
Jacob Vellhel

Fig. 2.



Inventor:
Charles Gahren
By atty. J. P. McCarter

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Fig. 3.

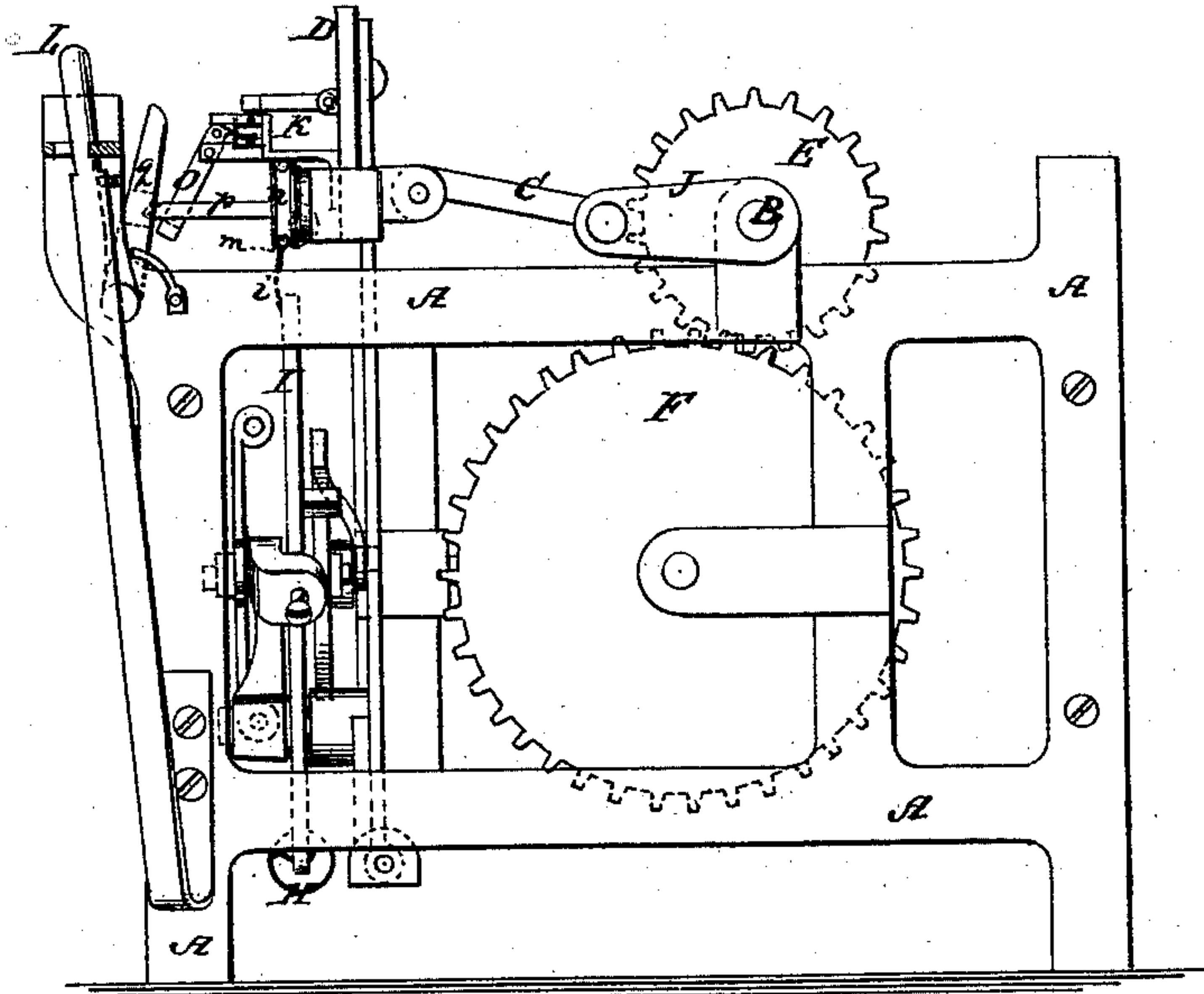
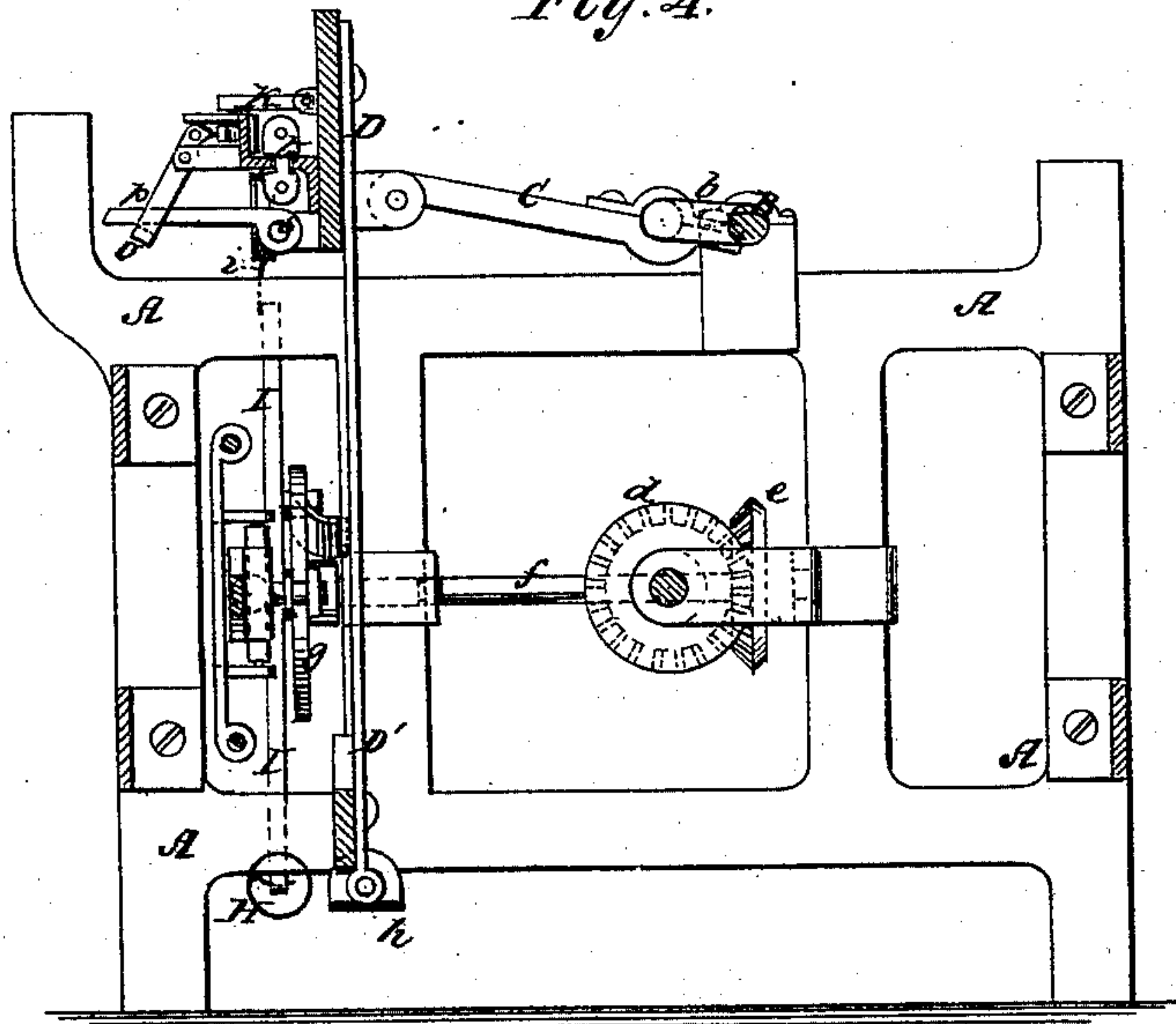


Fig. 4.



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Fig. 5.

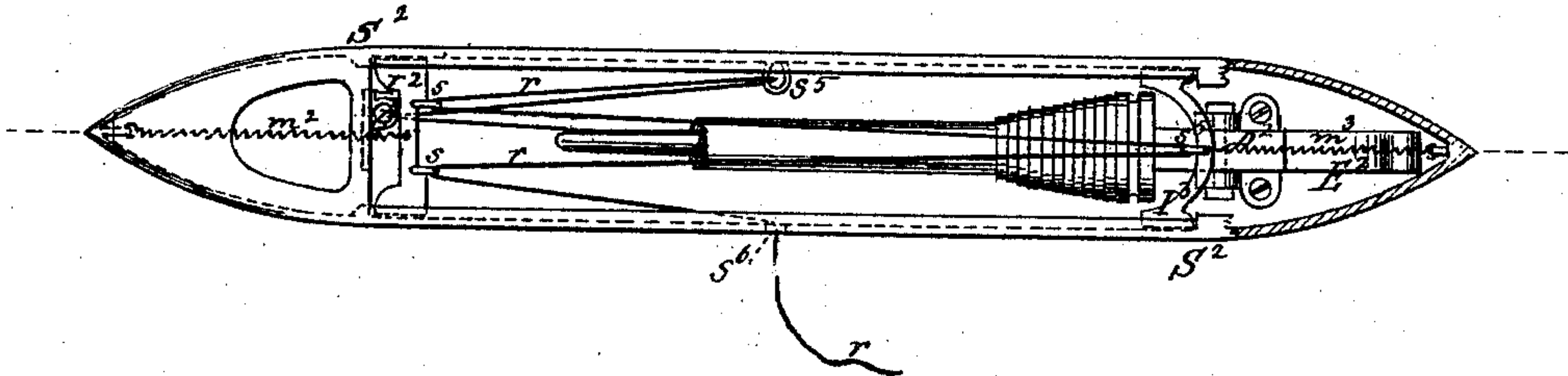


Fig. 6.

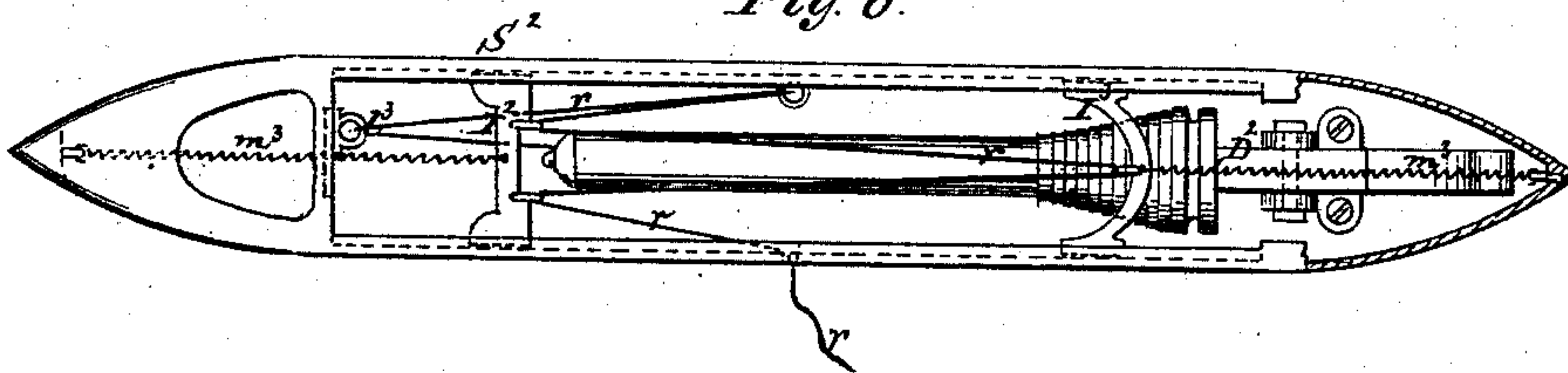


Fig. 7.

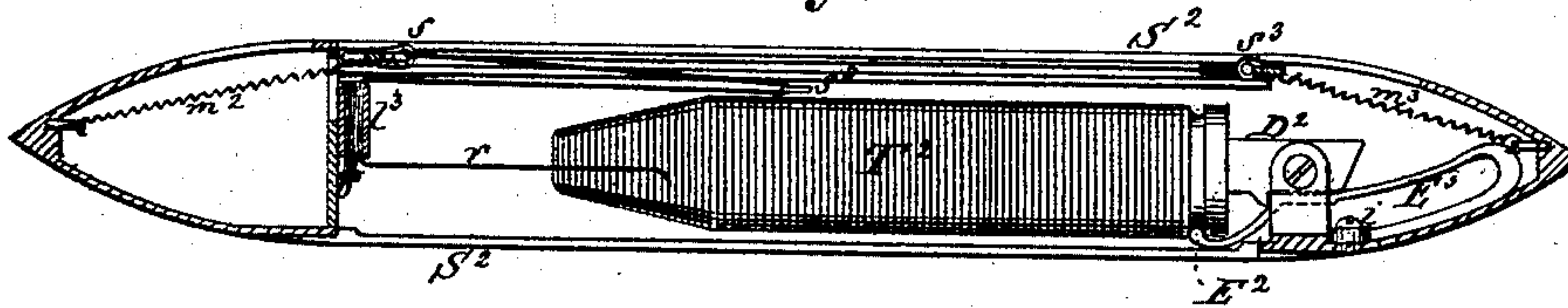
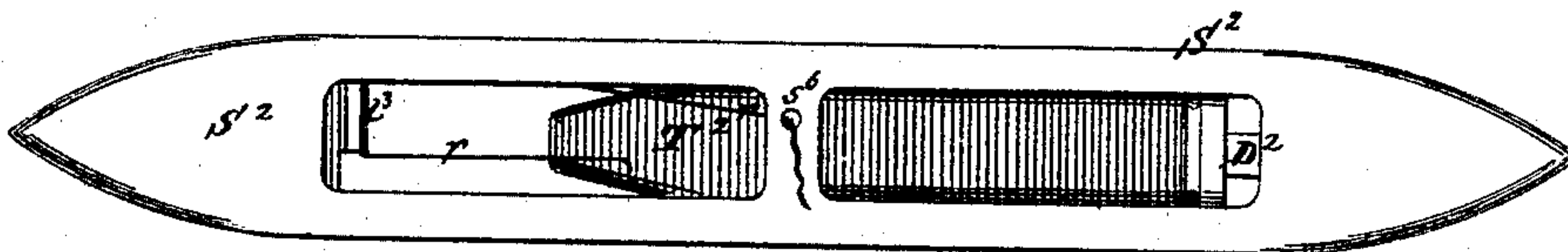


Fig. 8.



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Fig. 9.

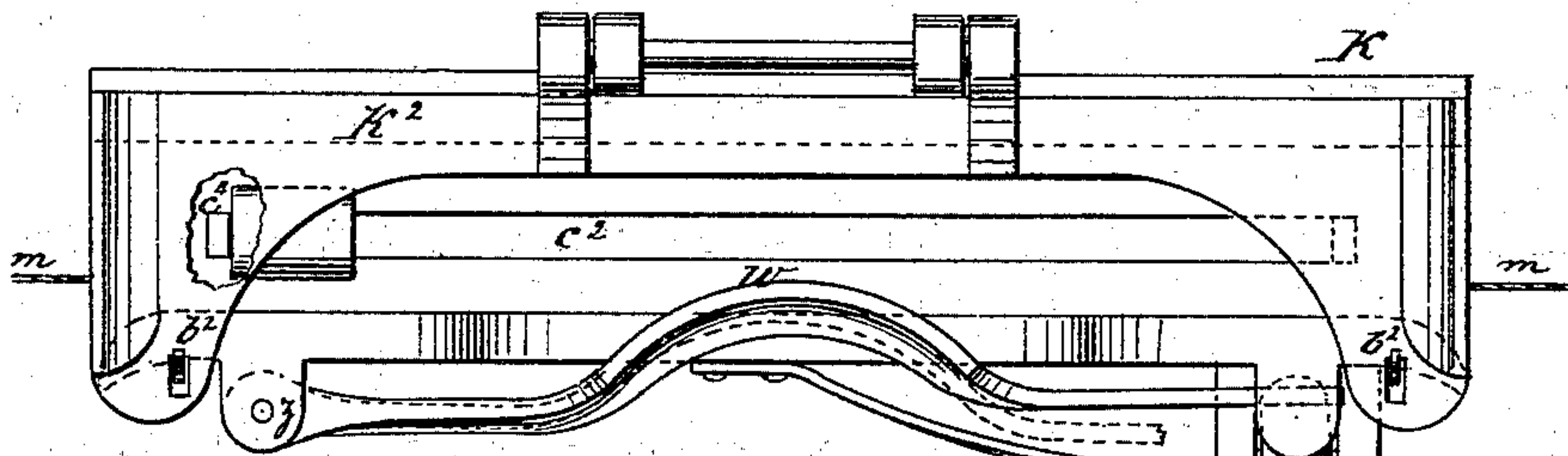


Fig. 10.

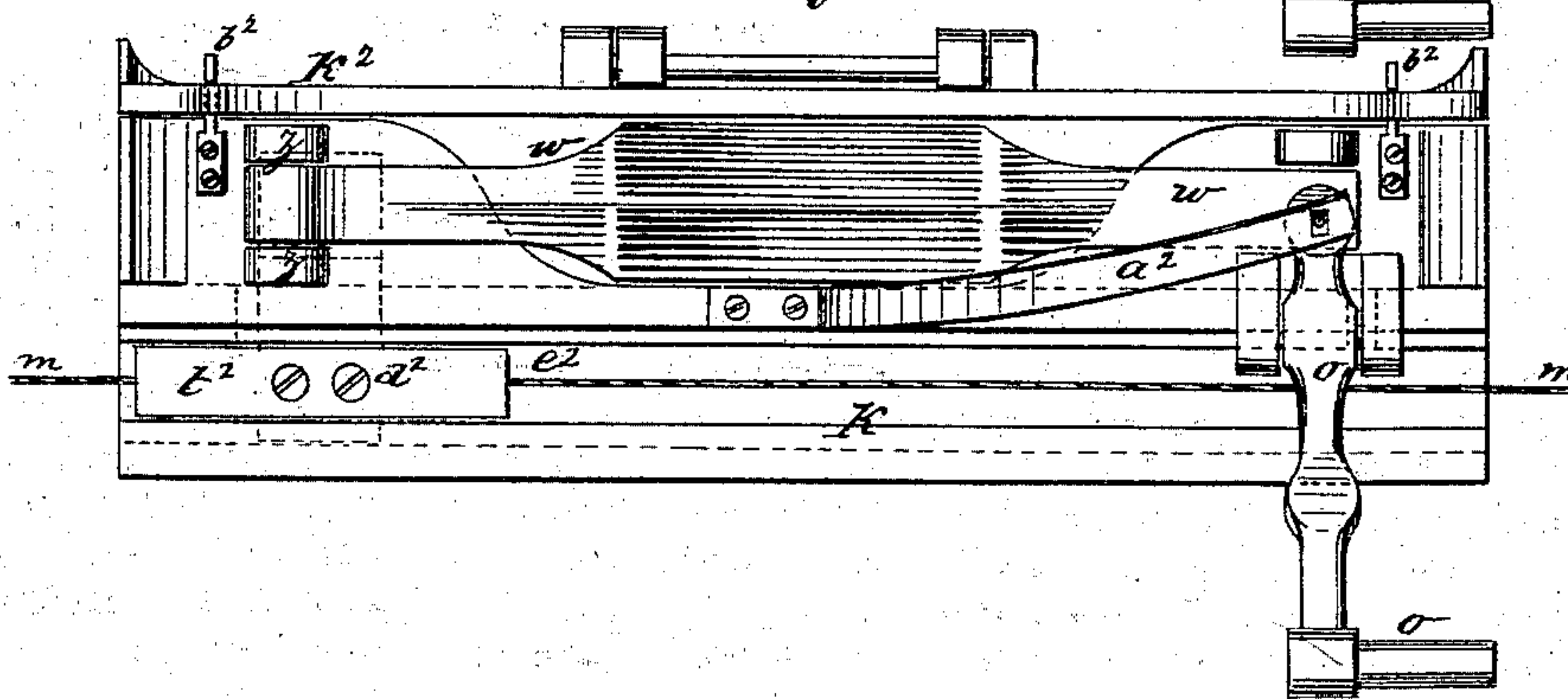


Fig. 11.

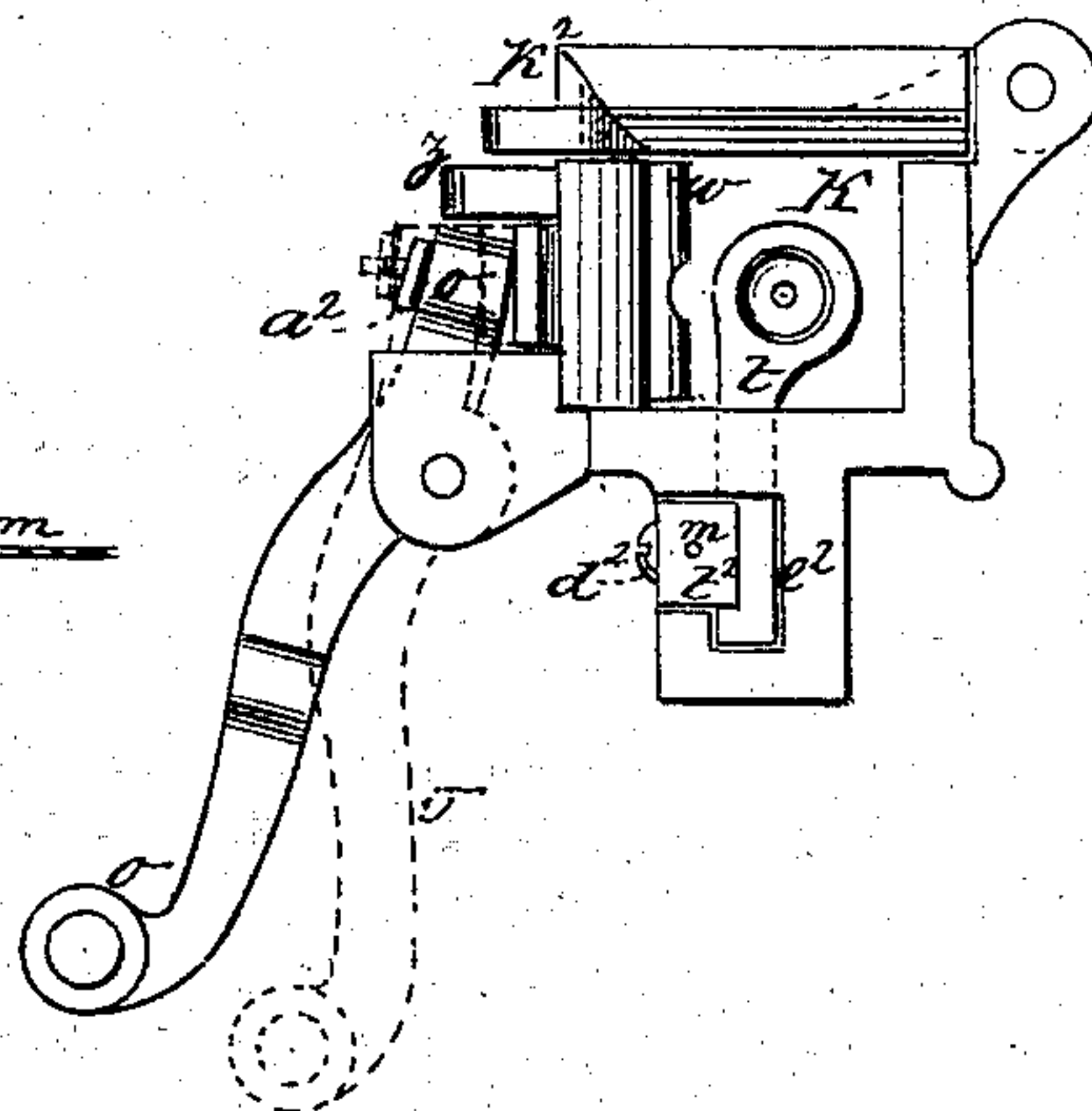


Fig. 12.

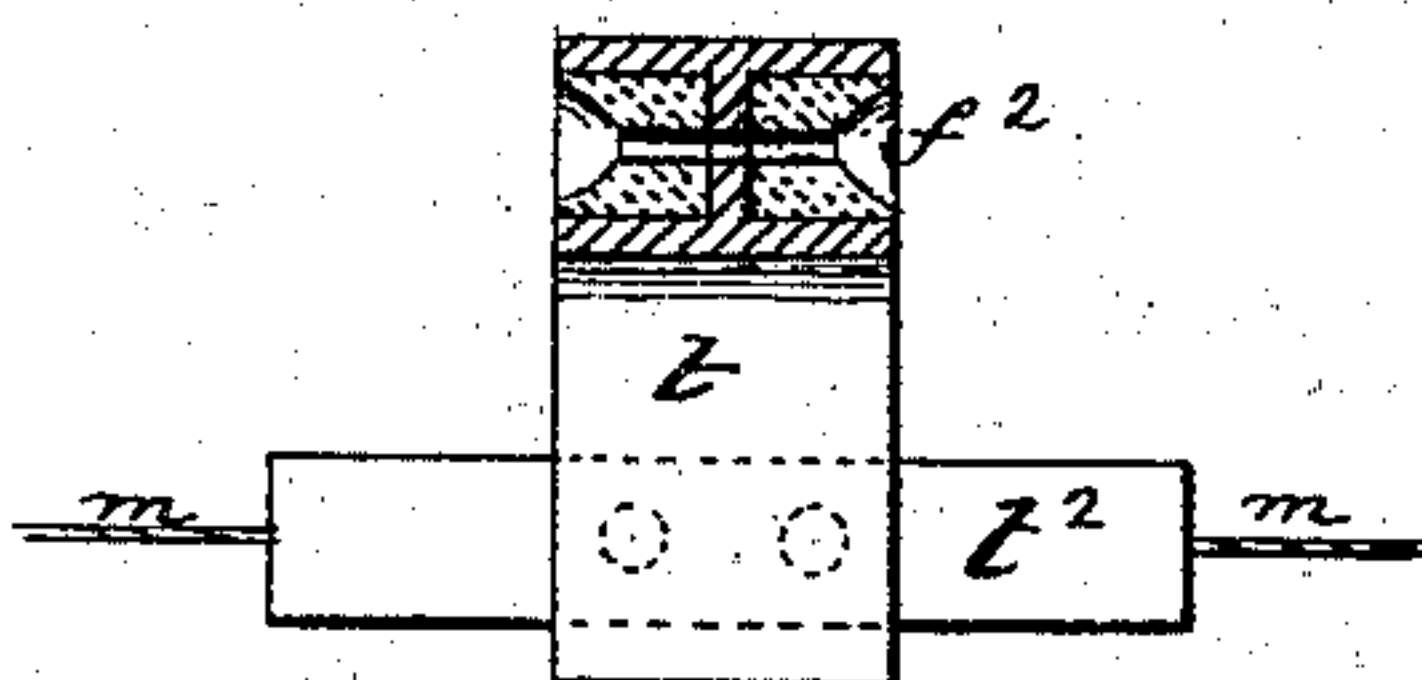
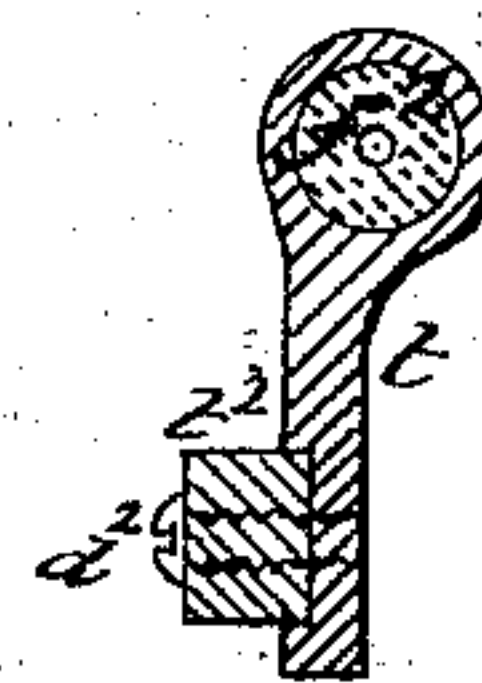


Fig. 13.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

CHARLES GAHREN, OF NEW YORK, N. Y.

IMPROVEMENT IN LOOMS FOR WEAVING CORSETS, &c.

Specification forming part of Letters Patent No. 154,035, dated August 11, 1874; application filed November 20, 1873.

To all whom it may concern:

Be it known that I, CHARLES GAHREN, of the city, county, and State of New York, have invented certain new and useful Improvements in Looms; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to looms for weaving corsets or other irregularly-woven articles, and also to looms for weaving other fabrics, of which several webs are woven side by side at the same time; and its general object is the more successful use of fly-shuttles in such looms. It consists in improvements in the shuttle take-up, whereby the fly-shuttle is made without difficulty to adapt its functions to the varying width of warp to be filled; also, in certain novel and simple shuttle-operating mechanism, whereby any desired number of fly-shuttles may be operated with facility; and, further, in an improved stop mechanism, whereby the failure of any one of a series of shuttles to enter its box may produce the stoppage of the loom without subjecting a long lay to any bending strain.

The following is a description of my invention:

In the accompanying drawings, Figure 1 is a front elevation, Fig. 2 a rear elevation, of the loom. Fig. 3 is an end view, Fig. 4 a vertical cross-section at *x x*, Fig. 1, and Figs. 5, 6, 7, and 8 are, respectively, two top views, a vertical longitudinal section and a side elevation, of the shuttle. At Figs. 9, 10, and 11 are shown, in top view, front view, and end elevation, one of the shuttle-boxes; and at Figs. 12 and 13 are detail cross and longitudinal sections of the shuttle driving and holding device.

A is the frame of the loom; D, the lay, the swords or frame D' of which are hinged at *h* to the frame A. *c c* are the reeds, carried by the lay. B is a driving-shaft, provided with a pinion, E, that meshes into and drives the spur-gear F of the counter-shaft G. The shaft B, through the medium of pitmen C, drives the lay D, and the counter-shaft G is provided with a bevel-gear, *d*, which engages with and drives a similar gear, *e*, on a shaft, *f*, located

near the middle of the machine, and at about right angles to shaft G. On the front end of shaft *f* is a crank-plate, *g*, (see Figs. 1 and 4,) the wrist-pin of which is connected by a universal or ball joint to one end of a pitman, M, the other end of which is jointed at N to a frame, O, that has a reciprocating motion lengthwise of the machine, is connected to the frame of the lay, and operates the picker-sticks I in a manner to be presently explained.

H is a spiral spring, which actuates or serves as the motor for the picker-sticks I I. This spring is attached, at each end, to the lower extremity of one of said picker-sticks, and tends to vibrate each of said sticks in the direction to throw the shuttle-driving devices; and the power of said spring is augmented, during its distention, by the movements of the sticks I I themselves, as will be presently explained.

These picker-sticks and their connected devices are duplicates, so that a description of one will answer for both. Each one moves the shuttle-driving device in one direction, and opposite that induced by the other.

The stick I is pivoted, at *x*, to the frame D' of the lay, and has attached to its upper end a cord or other flexible coupling device, *i*, by means of which a connection is formed with an endless cord or band, *m*, mounted on the small pulleys *n n*, and secured at intervals to shuttle-driving devices *t t*, &c., as and for purposes to be presently explained.

The stick is provided with a lug or projection, *y*, which catches into a latch-bar or catch, *k*, pivoted to the lay-frame, as shown, and is brought into the proper position to effect the engagement of said lug and latch by the movement of the upper arm *l* of a Z-shaped rock-ing-lever, *u*, which is mounted on the axis about which the stick I vibrates. This rock-ing-lever *u* also effects, by means of its lower end and a screw, *v*, arranged therein, the tripping of the catch *k* to release the lug *y*, and permit the spring H to actuate the picker-stick I.

I have made the frame O so that it can straddle the crank-plate *g* as the lay moves back, and have connected the crank-pin of plate *g* to pitman M, and said pitman to the frame O, by universal or swivel joints, because it is

necessary to avoid any interference of the lay with the driving-crank, and also to provide a means which will permit the pitman to drive the frame O in every position it may assume while traveling back and forth with the lay; but other forms of the frame O, and some other contrivance for the accomplishment of the purposes just mentioned, may be employed.

K K, &c., are five shuttle-boxes, one more than the number of reeds *c c c c*. These boxes K are open at both ends, and are adapted to receive a shuttle at each end. Each shuttle-box is slotted at its bottom to accommodate and permit the free passage of a shuttle-driving device, *t*, which is moved by the cord *m*, to which it is secured, and said box is provided with a spring-lever, *w*, which controls the mechanism for stopping the loom.

The construction of the shuttle-boxes K, and that of the actuating fingers or dogs *t*, will be best understood by reference to Figs. 9, 10, 11, 12, and 13, where these parts are drawn on a comparatively large scale.

The box K has a bar, *w*, pivoted at one end to a projecting ear or stand, *z*, on the front of the box, and so shaped that its middle curved portion projects into the box slightly, (see Figs. 9 and 11,) and against the free end of said bar *w* the upper end of the oscillating-lever *o* presses, which, in turn, is pressed upon by the end of a spring, *a*², fastened to the box.

From this construction it follows that when the shuttle, which is of a size and shape to about fill it, enters the box K, it will press out the arm *w*, the free end of which will then force and hold out the upper end of the lever *o*, so that the lower end of the latter will be maintained in about the position illustrated by the dotted lines at Fig. 11. The object of holding the said lever *o* in this position when the shuttle is present in the box will be presently explained.

The box K is made as usual, with a hinged lid, K², which I secure in a closed condition, by means of two spring catches, *b*² *b*², as shown, and it is formed with a slot, *c*², in its bottom, in which travels the finger *t*, before referred to. This part *t* is made in the form of a hollow cylinder, with a leg portion, which passes down through the slot *c*², and is free to slide longitudinally therein. This leg or lower portion has a recess formed in it, into which is fitted and securely fastened, by screws *d*², a short bar or carriage, *t*², that takes a bearing against the top and bottom of, and rides longitudinally in, the channel or recessed portion *e*² of the shuttle-box. (See Figs. 10, 11, 12, and 13.) The objects of this peculiar construction are to more securely unite the leg *t* and portion *t*² than they could be by the screws without any interlocking device, and to get a longer bearing of the part *t*² in the channel *e*², to better withstand any strain or shocks occasioned when the shuttle comes suddenly against the upper end of the finger *t*. In the upper cylindrical portion of *t* is securely fitted a cushion, *f*², of rubber, cork, or other suitable slight-

ly-elastic material, which cushion has a small hole running centrally through it, and is cup-shaped or tunnel-like at its ends, as seen at Figs. 13 and 12. The object of this shape is to adapt the cushion at each end to just fit over the pointed end of the shuttle, and form a perfect seat for it, without, however, touching the extreme point of the shuttle.

The construction of the shuttle which operates in conjunction with the boxes and mechanism just described, and the take-up mechanism of the shuttle, will be best understood by reference to Figs. 5, 6, 7, and 8. The shuttle S² is of about the size and form of an ordinary "fly-shuttle." T² is the bobbin, held in the usual manner on the hollow spindle of the shuttle. I² and I³ are two carriages or sliding cross-bars, which are mounted to move freely in longitudinal grooves formed in the sides of the shuttle near its upper edge, and which have connected to them springs or elastic cords *m*² *m*³, the tendency of which is to hold said cross-bars, respectively, toward the ends of said grooves. One of these sliding bars, I², is provided with two eyes, *s s*, while the other has one, *s*³, and through these eyes passes the thread from the bobbin T². The springs or rubber cords *m*² *m*³ are each fastened at one end to a stationary eye, *n*, or staple at the end of the shuttle, as shown, and at I³ is the usual tension tube, through which the thread from the bobbin first passes. It then passes to a stationary eye, *s*⁵, on one side near middle and upper edge of the shuttle; thence through one of the eyes *s* of cross-bar I²; thence through the eye *s*³ of bar I³; thence through the other eye *s* of bar I², and thence through exit-eye or hole *s*⁶ of the shuttle. The sliding bars are shown at Fig. 5 in their normal positions, while in Fig. 6 they are shown as moving toward their other extreme position near the middle of the shuttle.

When the thread *r* is drawn through the hole *s*⁶ of the shuttle to put in a pick the thread first draws the sliding bars I² I³ toward each other and to the middle of the shuttle, so that the eyes *s s*, the eye *s*³, and the stationary and exit eyes *s*⁵ and *s*⁶ are arranged nearly in line, and then pulls through the tension-tube I³, unwinding them from the bobbin; and that the moment all pulling and retaining force ceases the thread is taken back by the movement of the cross-bars toward the ends of the shuttle, and to their normal position.

The stop mechanism is composed of a rod, *s*, running the whole length of the loom, and having projecting from it a number of arms, *p*, (see Figs. 1, 3, 4,) one of which is adapted to come against a tripping-lever, *q*, and operate the mechanism for stopping the loom and putting on a break in the usual manner. L is the hand-lever for throwing the power on. The stop mechanism is not fully shown, as my invention relates only to that part of the mechanism which is connected with the shuttle-boxes.

The operation of the parts already described will be understood with little further explanation.

The four shuttles are thrown simultaneously, first in one and then in the other direction, by one of the picker-sticks *I*, through the medium of the series of shuttle-drivers *t* attached to the cord *m*.

In the condition in which the parts are shown at Fig. 1 the shuttles would all be housed in those of the boxes *K* which are on the right-hand side of the reeds *c*, and as the lay receded and the warp was lifted the crank-plate *g* would make a half-revolution, causing the pitman *M* to move the frame *O* in the direction indicated by the arrow in Fig. 1, whereby the lever *I* on the right of the machine would be disengaged from its catch *k* and suddenly thrown, by its spring *H*, into the condition in which the lever on the left now appears. By this sudden vibration of the picker-stick its connecting-cord *i* would be made to jerk the endless band *m*, (as indicated by the arrows,) which carries the shuttle-drivers *t*, causing all four of the shuttles to fly over to the boxes on the left-hand side of the reeds.

Whenever the shuttle flies through the warp its thread is carried clear through; but if the picks are being inserted at one side only of the warp, as in forming the gussets of the corsets, the surplus weft-thread will be drawn back each time into the shuttle by the take-up mechanism of the shuttle, already described; and this take-up device is capable of drawing back from fifteen to seventeen inches of thread in a fly-shuttle of the usual width and about twelve inches long.

Each one of the shuttle-drivers has a throw about equal to the length of the shuttle, and acts alternately as a device for impelling a shuttle and a device for stopping or receiving one—that is to say, as the shuttle-boxes *K* are open at both ends and the shuttles enter them from first one and then the other direction, every time a finger, *t*, makes a stroke it throws a shuttle from its box and stops at the opposite end of said box, ready to receive, in the opposite end of its cushion *f*², the point of the shuttle which is to be thrown into said box by another finger, and which is to enter said box in the same direction as that in which the last shuttle took its departure. By having the picker-stick moved by a spring, which is put under tension by the movements of the working parts of the loom and brought suddenly into action as a motor by a tripping device, I am enabled to effect the proper flight of the shuttle, irrespective of how, or at what point in the movement of the lay, and other parts, the loom may be stopped or started.

The spring *H* being connected at each end to the lower extremities of the picker-sticks *I*, as shown, and these sticks being vibrated, in one direction, by the positive motion of the frame *O*, and the two sticks being so arranged and moved that the upper end of one is drawn toward the center of the ma-

chine, to be locked ready for action, just as the other stick is to be tripped or let fly, it follows that the spring *H* is distended for action, each time, by first one and then the other of the picker-sticks, and that each picker-stick, when tripped or let fly, has the benefit of a force equal to the maximum power of the whole length of said spring *H*.

As the shuttle flies into the box *K*, through either end of the latter, its flight is checked, first, by the friction created by contact, at its side, with the curved portion of the spring-bar *w*, and then, by its forward end or point striking into the cushion-seat *f*² of the receiving-finger *t*; and to still further ease off the stoppage of the shuttle, this finger is carried along slightly by the shuttle till it comes to its seat against the end of the slot *c*², where I have placed a yielding bearing or slight elastic seat or stop, *c*⁴, of leather or other suitable material. As I have before remarked, the throw or motion of the finger *t* is such that, at each stroke, it moves from one end to the other of its path of motion; but, by reason of the flexible connection *i*, between the picker-stick *I* and the actuating band *m*, to which said finger is secured, the latter slightly rebounds at the end of its stroke in the slot *c*², so as to be placed in a position to permit the slight motion just described as occurring when struck by a shuttle entering the box.

Whenever, from any accident, any one of the shuttles fails to come home into its box *K*, the spring-bar *w* will remain in its normal position, and in this position the lever *o* (see Figs. 9 and 11) will remain in the position shown in full lines in the drawing, and so hold up one of the arms *p* (see Figs. 1 and 3) as to bring one of said arms into contact with the stopping mechanism of the loom as the lay beats up, as at each time all the shuttles fly there must be left unoccupied, by any shuttle, a box at one end of the whole series; and as this unoccupied box, without some preventive, would be the means, through its bar *w* and arm *p*, of stopping the loom, I provide the cord or band *m* with the "blinds" or false shuttles—that is, a light frame or box, of any kind, equal in width to the width of a shuttle, and attach them one near each end box of the series, so that, at each throw of the shuttle-driving mechanism, one of these blinds or "false shuttles" will be brought into that end box which is left without any shuttle in it, for the purpose of forcing and holding outward the bar *w* of said box, and thus preventing any automatic stoppage of the loom.

As the whole series of arms *p* are fast on one shaft *s*, it follows that if any one of the spring-bars *w* is not forced out by the proper entrance of the shuttle, the shaft *s* will be prevented from turning downward by the retention of that arm *p* which is in contact with the spring-bar not affected by the presence of a shuttle, and the loom will be stopped.

This feature of my machine is one of con-

siderable practical importance, for by it all possibility of a failure in the automatic stoppage of the loom, in the event of any one of the shuttles not properly coming home to its box, is avoided, and this perfection of operation will follow, no matter how many gangs, or shuttles, reeds, and boxes may be in the series. By having the projecting and stopping fingers *t* provided with the cushions or elastic seats *f*² fitting the ends of the shuttles, as described, any tendency of the shuttle to waver in its flight, when starting off on the fly, is overcome by the tendency of the surrounding cushion *f*² of the propelling finger, to hold the axis of the shuttle in line.

Having fully explained the several features of my improvements, and so described the construction and operation of a loom embodying them, that one skilled in the art can make and use the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a shuttle adapted to be used as a fly-shuttle, of a take-up mechanism composed of sliding bars with eyes, and eyes in the shuttles, substantially as herein described.

2. A series of fly-shuttles, fitted with take-up mechanism composed of sliding-bars with eyes, and eyes in the shuttle, in combination with a series of shuttle-boxes open at both ends, substantially as herein described.

3. The combination, with a series of fly-shuttles, and a series of shuttle-boxes open at both ends, of a series of shuttle-drivers attached to one endless band which runs on pulleys attached to the lay and flexibly connected picker-staves arranged inside of the side frames of the loom, substantially as herein specified.

4. The combination, with the picker-sticks, of catches *k k* attached to the lay-frame for engaging with the said sticks, levers *u u* attached to the said frame for engaging, and the said catches from the sticks, and a spring, *H*, connecting the sticks, the whole operating substantially as and for the purpose herein described.

5. In combination with a series of shuttle-boxes and a means for arresting the throw of the lay, the series of stop-fingers or levers *p*, one for each shuttle-box, all fast to the shaft *s*, but only those two fingers at the ends of the shaft operating directly upon the stop-mechanism, substantially as herein described.

In testimony whereof I have hereunto set my hand and seal this 17th day of November, 1873.

CHARLES GAHREN. [L. S.]

In presence of—

J. N. MCINTIRE,
JACOB FELBEL.