(No Model.) 3 Sheets—Sheet 1.

A. D. EMERY.

WEFT STOP MOTION FOR LOOMS.

No. 605,601. Patented June 14, 1898.

Fig. 1

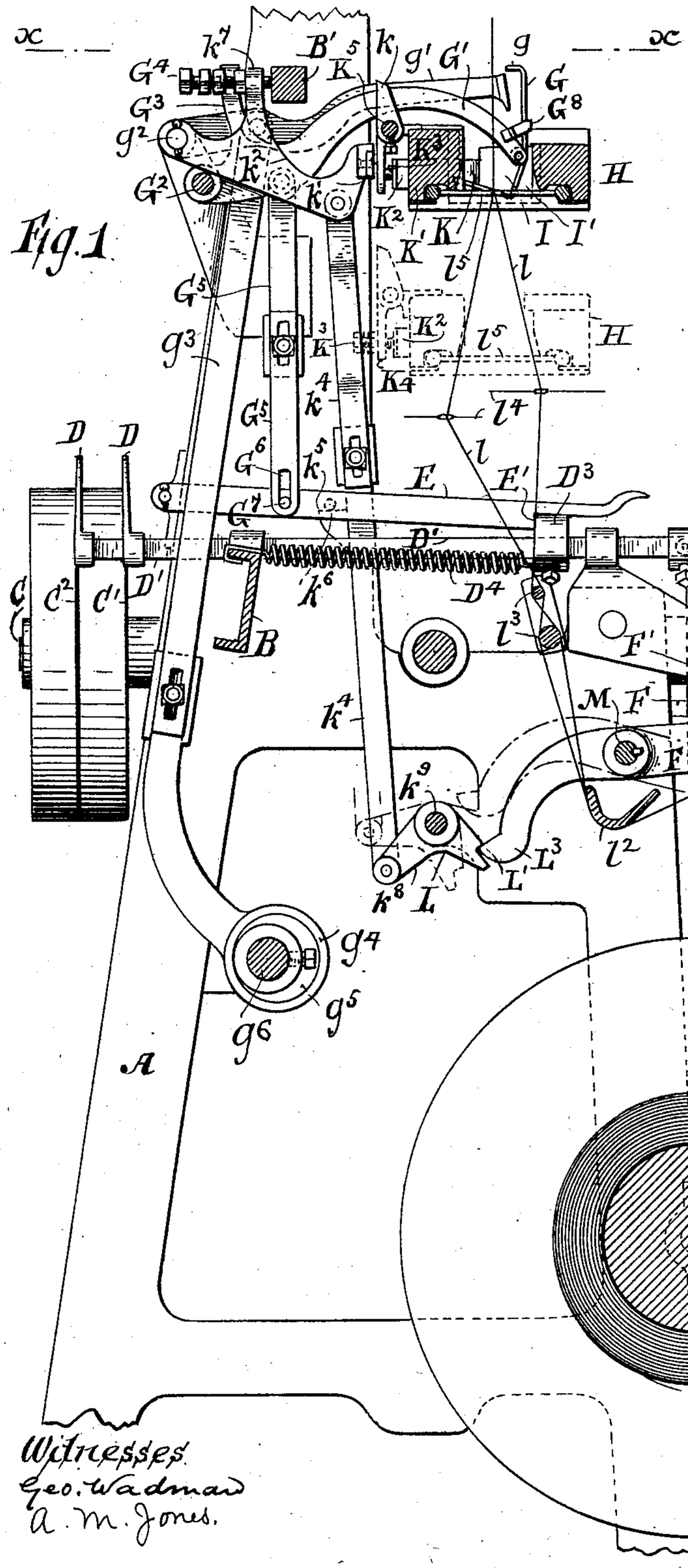
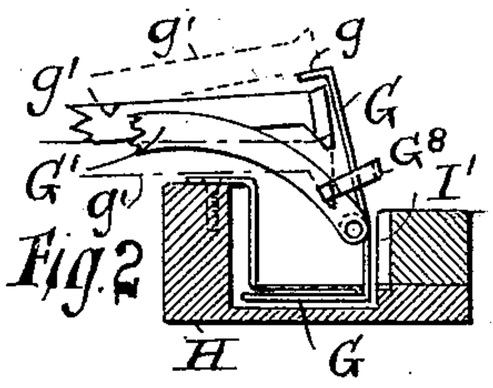


Fig. 2



Witnesses.
Geo. Wadman
A. M. Jones.

Inventor
Abram D. Emery
Per Edw. E. Lemby
Atty.

(No Model.)

3 Sheets—Sheet 2.

A. D. EMERY.

WEFT STOP MOTION FOR LOOMS.

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Fig. 3

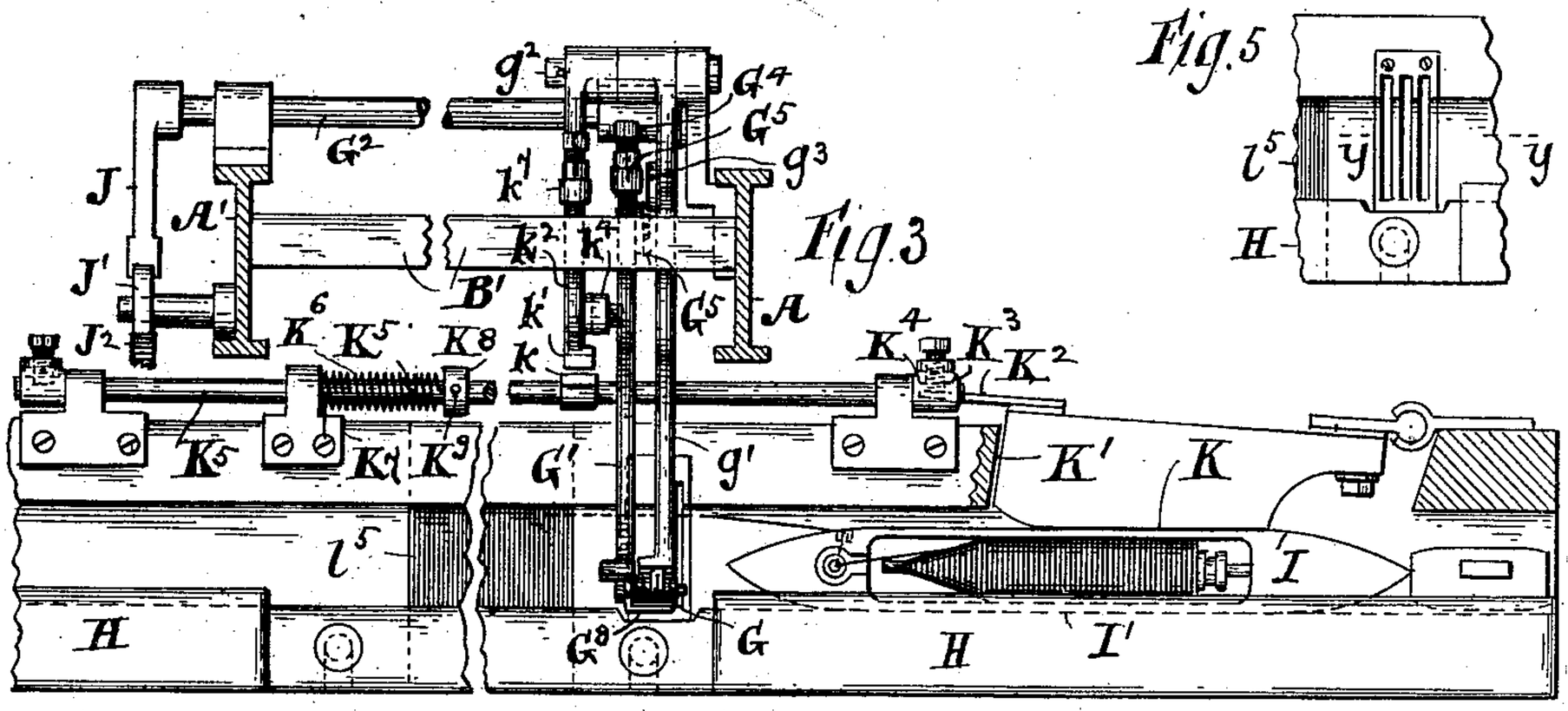


Fig. 5

Fig. 4

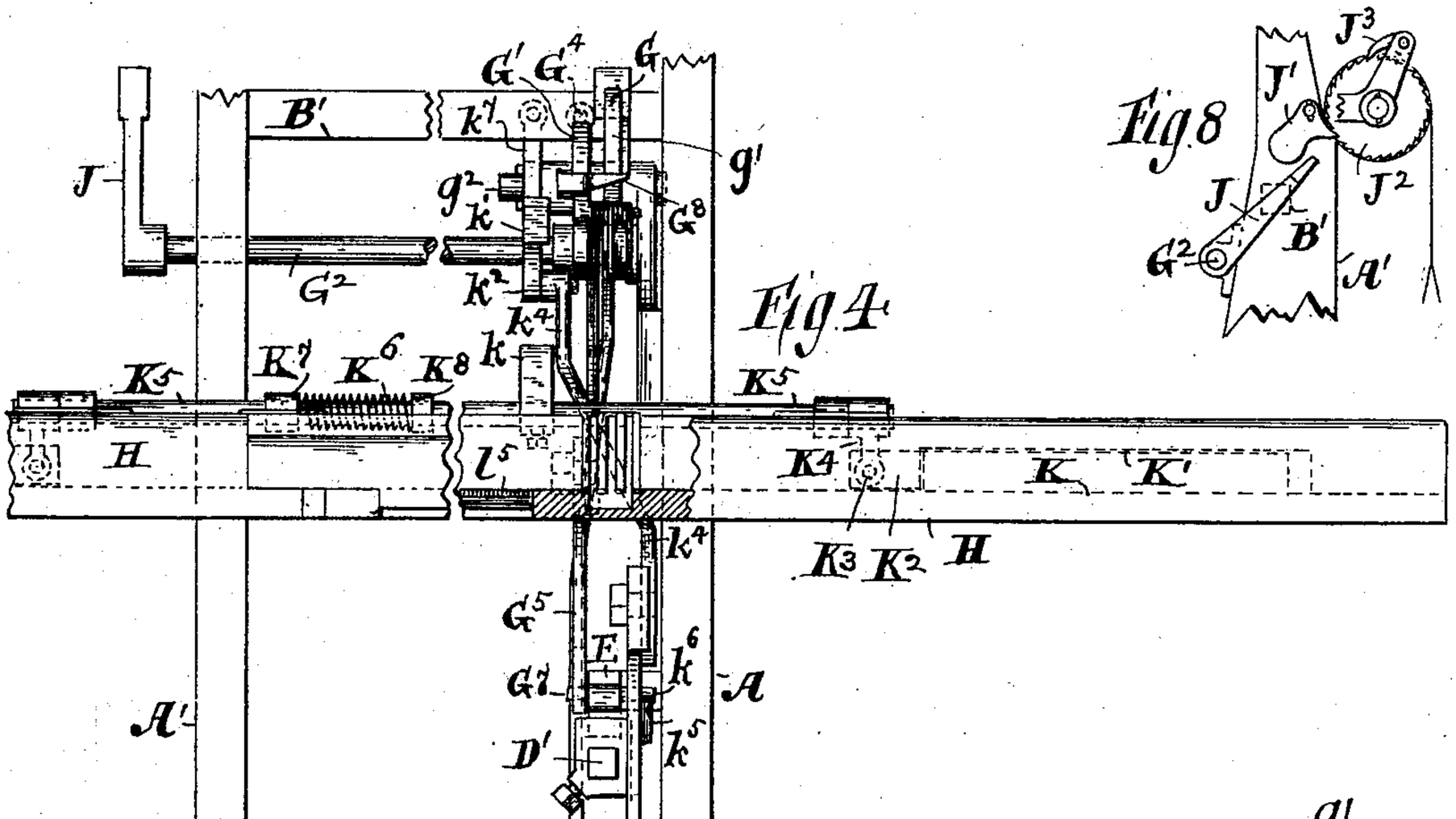
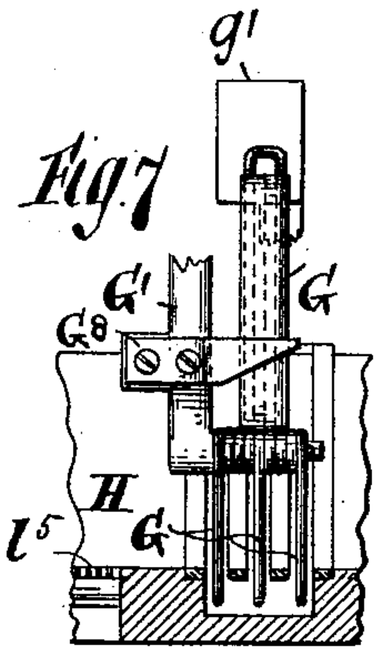


Fig. 8

Fig. 6

Fig. 7



Witnesses
Geo. Wadman
A. M. Jones.

Inventor
Abram D. Emery
Per Edw. E. Dunlap
Atty.

(No Model.) 3 Sheets—Sheet 3.

A. D. EMERY.

WEFT STOP MOTION FOR LOOMS.

No. 605,601. Patented June 14, 1898.

Fig. 9

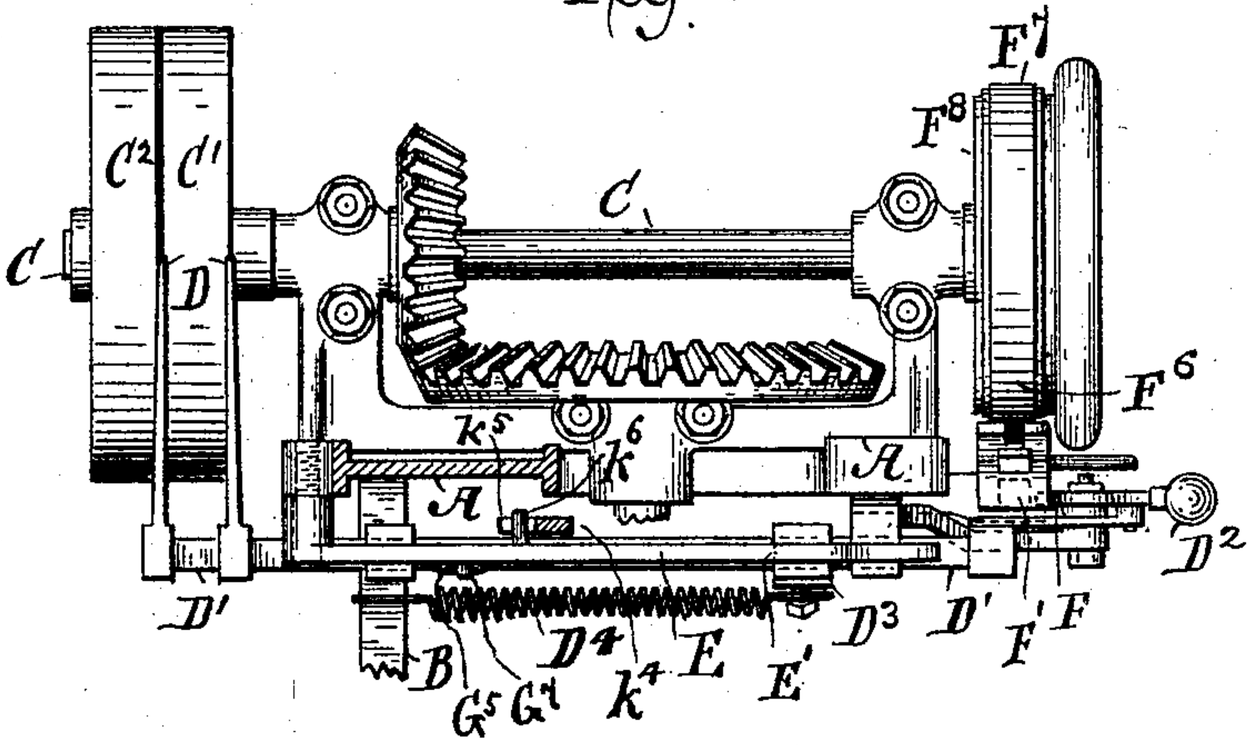
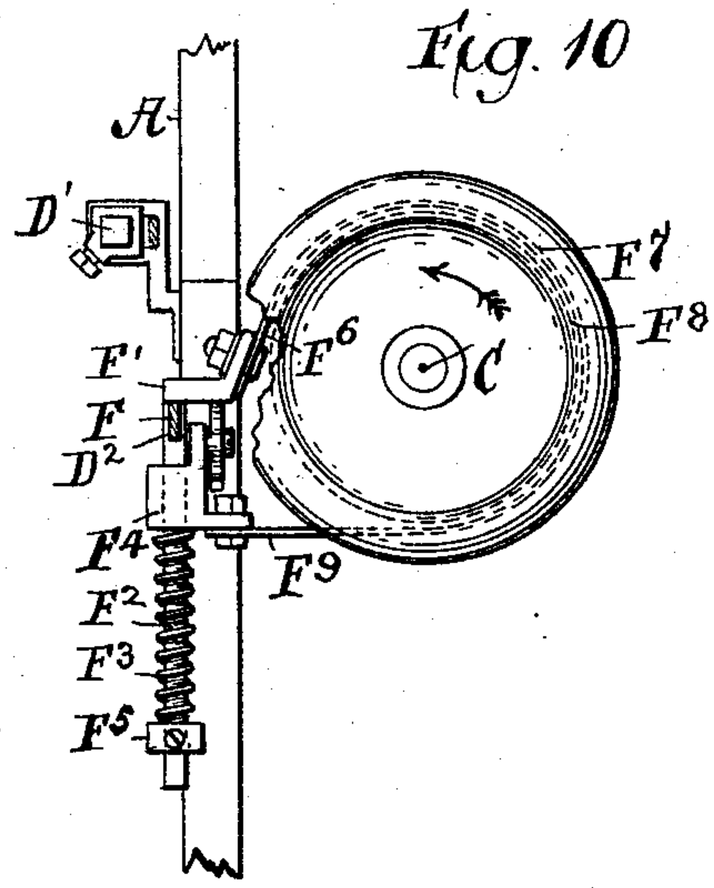


Fig. 10



Witnesses
Geo. Wadman
A. M. Jones.

Inventor
Abram D. Emery
Per Edw. E. Lumby
Atty.

UNITED STATES PATENT OFFICE.

ABRAM D. EMERY, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE UNIVERSAL LOOM COMPANY, OF NEW YORK, N. Y.

WEFT STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 605,601, dated June 14, 1898.

Application filed February 19, 1897. Serial No. 624,113. (No model.)

To all whom it may concern:

Be it known that I, ABRAM D. EMERY, of Taunton, Massachusetts, have invented certain Improvements in Weft Stop-Motions for Looms, of which the following is a specification.

My improvements, which are herein illustrated as embodied in an upright loom employing a shuttle stop-motion of the character of that shown and described in my pending application for Letters Patent of the United States serially numbered 624,384, consist of a weft stop-motion, the weft-fork of which is by means of suitable connections combined with the spring-actuated progressively-acting stopping instrumentality, which in my pending application Serial No. 596,248 is shown, described, and claimed, in combination with a plurality of stop-motions, with common connections to said stopping instrumentality. The said stopping instrumentality is adapted to bring the operative parts of the loom to rest without any smash entirely by its progressive action during a prescribed part of one revolution of the lay-driving shaft and is combined in the present case with a weft stop-motion, which is brought into operation if the weft breaks or runs out and which is so timed as to perform its function of tripping said progressively-acting stopping instrumentality into action at such predetermined stage in the revolution of the lay-driving shaft as will result in stopping the loom with the lay down, the shed open, and with the shuttle in that one of the boxes where it is most convenient of access for the purpose of replacing the weft. By means of suitable connections the weft-fork is so combined with the take-up mechanism that the effective operation of the take-up mechanism terminates concurrently with the beat by which in the absence of a weft the weft stop-motion is brought into operation.

The accompanying drawings, representing the weft stop-motion, also show the shuttle stop-motion referred to, together with so much of the loom as is necessary to illustrate the modes of operation of the stop-motions. The drawings are as follows:

Figure 1 is a transverse vertical section of an upright loom, showing the principal members of the stop-motions in elevation. Fig. 2 is a transverse section of the lay, showing the manner in which the weft stop-motion is set into action if a weft-thread breaks or gives out. Fig. 3 is a horizontal section taken through the plane indicated by the dotted line $x\ x$ on Fig. 1, affording a top view of portions of the lay and the stop-motions. Fig. 4 is an elevation, partly in section, of the parts shown in Fig. 3. Fig. 5 is a top view of the portion of the lay immediately adjacent to the weft-fork. Fig. 6 is a vertical section taken through the plane indicated by the dotted line $y\ y$ on Fig. 5, showing the vertical recesses for the weft-fork in the wall of the lay. Fig. 7 is an elevation of the weft-fork, showing the adjacent part of the lay in vertical section. Fig. 8 is an end elevation of the take-up and the device for tripping it out of action. Fig. 9 is an elevation of the driving-gear, showing the belt-shifter, the brake-wheel, and their appurtenances. Fig. 10 is an elevation showing the face of the brake-wheel and adjacent parts.

The drawings show portions of an upright loom-frame composed in part of the standards A A′ and the horizontal girders B B′.

The driving-shaft C is provided with the driving-pulley C′ and the loose pulley C^2. The position of the driving-belt is governed by the belt-shifter forks D D, affixed to the horizontal slide-bar D′, having pivoted to its front end the hand-lever D^2. A collar D^3, affixed to the slide-bar D, has attached to it the free end of a contracting spiral spring D^4, the opposite end of which is secured to the girder B. When the loom is running normally, the driving-belt, as shown in Fig. 1, is retained in engagement with the driving-pulley C′ by means of the trip-lever E, pivoted at the rear end to the frame of the loom and having near its forward end a shoulder E′, which engages the collar D^3. When the hand-lever D^2 is swung outward into the position in which it is represented in Fig. 1, the toe F, projecting laterally from its hub, engages a collar F′, affixed to the upper end of the slide-rod F^2 and pulls the slide-rod F^2 upward and thereby compresses the expanding spiral spring F^3, which abuts at its upper end against the perforated bracket F^4, through

which the rod F^2 slides, and delivers its thrust against the collar F^5, affixed to the lower end of the slide-rod F^2. The collar F' on the upper end of the slide-rod F^2 has fastened to it the free end F^6 of the brake-strap F^7, which partially surrounds the brake-wheel F^8, affixed to the driving-shaft C, and has its opposite end F^9 secured to the frame of the loom.

The stopping of the loom involves the lifting, either manually or otherwise, of the forward end of the trip-lever E. This disengages the shoulder E' from the collar D^3, and thus releases the belt-shifter slide-bar D' to the action of the contracting spring D^4. The spring D^4 then pulls the slide-bar D' backward and shifts the belt to the loose pulley C^2 and at the same time swings backward the hand-lever D^2, swinging downward the toe F and thereby releasing the brake-strap F^7 to the influence of its adjustable actuating-spring F^3. When the toe F is withdrawn from the collar F', the brake-strap F^7, being thus released, is tightened around the brake-wheel in part by the expansion of the spring F^3 and in part by the frictional influence upon the brake-strap of the periphery of the brake-wheel, which rotates, as indicated by the curved arrow on Fig. 10, in such direction as to make that frictional influence tend to pull the brake-strap away from its fixed end F^9 and thus cause it to tighten itself upon the brake-wheel. The effectiveness of the strap-brake thus organized is such that by varying the position of the collar F^5 the tension of the spring F^3 can be so regulated with relation to the speed at which the loom is running as to always effect the the stopping of the loom at the expiration of a predetermined period after the belt-shifter and strap-brake have been released by the tripping of the trip-lever E, and the loom can thus always be brought to rest with its parts in a prescribed position. The tripping of the trip-lever E is automatically effected by the operation of the herein-described weft stop-motion whenever a weft-thread breaks or runs out.

The weft stop-motion embraces the weft-fork G, pivoted to the free end of the lever G', which is affixed to the rock-shaft G^2, having its bearings in brackets affixed to the loom-frame. An arm G^3, extending laterally upward from the lever G', is provided with an adjustable screw-bolt G^4, adapted to bear against the girder B' and thereby act as a stop to limit the range of downward swing of the lever G'. A link G^5, connected at its upper end to the lever G', is provided near its lower end with a longitudinal slot G^6 for admitting a pin G^7, affixed to and projecting laterally from the trip-lever E.

If a weft-thread is present beneath prongs of the fork when the lay H ascends, the fork is tilted by the weft-thread into the position in which it is represented in Fig. 1, in which, as will be seen, its shank bears against the guard G^8, affixed to the lever G', and the backwardly-turned upper end g of the shank of the weft-fork is swung forward clear of the path of motion of the free end of the constantly-vibrating lifting-arm g', the opposite end of which is loosely mounted on a stud g^2, inserted transversely through a bracket secured to the loom-frame. At every two beats of the lay the lifting-arm g' is vibrated once upward and once downward by means of the pitman g^3, pivoted at its upper end to the lifting-arm g' and provided at its lower end with the eccentric-strap g^4, surrounding the eccentric g^5, affixed to the cam-shaft g^6, which makes one revolution while the lay-driving shaft is making two revolutions. The vibrations of the lifting-arm g' are so timed that the latter part of the upward excursion of the arm is coincident with the beat which ensues immediately after the shuttle I has been boxed in the shuttle-box I', adjacent to the fork G. If the weft-thread has run out or has been broken, the weft-fork under the influence of gravity retains the position in which it is represented in Fig. 2, and its backwardly-turned upper end g will be caught by the free end of the lifting-arm g', which therefore during the concluding part of its upward movement will carry upward the fork G and lift the free end of the lever G', and thus raise the trip-lever E clear of the collar D^3 and thereby trip the belt-shifter and brake into action and stop the loom.

During the time occupied in stopping the loom the lay descends to its lower position and the shuttle is thrown from the box I' into the box at the opposite end of the lay. Two useful results are thus secured, to wit: first, the loom comes to rest with the shed open, and, secondly, with the shuttle in the box adjacent the starting and stopping levers, where the new weft-thread can most conveniently be supplied and adjusted by the operator. When the lever G' is lifted, a finger J, affixed to the rock-shaft G^2, (illustrated in Fig. 8,) is swung upward and trips the retaining-pawl J' out of engagement with the ratchet-wheel J^2, which gives motion to the take-up roll. The ratchet-wheel J^2 is thereby left free to turn backward with its driving-pawl J^3, and consequently the take-up roll ceases to take up the fabric. The side walls and bottom of the lay H are suitably recessed to contain the weft-fork, as illustrated in Figs. 5, 6, and 7.

The shuttle stop-motion referred to is herein illustrated for the purpose of showing that, although it and the weft stop-motion are respectively combined with the same trip-lever for simultaneously tripping into action the belt-shifter and the self-tightening strap-brake, each is capable of independent operation without interfering with the other.

To stop the loom if the shuttle fails to box properly, each shuttle-box is provided with a movable cheek K, which works in a slot K', formed in the rear side wall of the box. The outer end of the cheek K is vertically pivoted to the lay, and its opposite end has affixed to

it a finger K^2, adapted to be pressed upon by the screw K^3, adjustably inserted through one of the crank-arms K^4 of the rock-shaft K^5. The rock-shaft K^5, which is provided with bearings upon the rear wall of the lay, extends across from one shuttle-box to the other and has at each end a downwardly-extending crank-arm like the arm K^4. (Shown in dotted lines in Fig. 1.) A torsion-spring K^6, surrounding the rock-shaft K^5, has one of its ends affixed to the box K^7, which affords one of the bearings for the rock-shaft and has its opposite end secured to the collar K^8, which is secured to the rock-shaft by the set-screw K^9. The torsional strain of the spring K^6 tends to press the crank-arms against the finger of the cheek-pieces K and thus rock the free ends of the cheek-pieces into the path of the shuttle. So long as the shuttle boxes itself properly in either box it pushes out the cheek-piece K of the box in which it is seated and thus rocks the rock-shaft K^5 against the influence of its torsion-spring K^6. A dagger *k*, rigidly secured to and projecting upwardly from the rock-shaft K^5, is thus swung out of operative position. If the shuttle fails to reach its place in either of the boxes, the rock-shaft K^5 is not rocked, and the dagger *k* inclines so far backward that during the latter part of the upward excursion of the lay the upper end of the dagger *k* catches under the shoulder *k'* on the free end of the lever k^2, the opposite end of which is loosely mounted upon the stud g^2, inserted transversely through a bracket secured to the loom-frame. The lever k^2 has pivotally connected with it the upper end of the adjustably-extensible link k^4, provided about midway of its length with the shoulder k^5, which, when the lever k^2 is pushed upward by the dagger *k*, engages the pin k^6, projecting laterally from the trip-lever E, and thus lifts the trip-lever E out of engagement with the collar D^3 and thereby trips the belt-shifter and strap-brake into action and quickly stops the loom. An arm k^7, projecting upwardly from the lever k^2, is provided with an adjustable screw-bolt which by bearing against the girder B' serves as a stop to limit the range of downward movement of the lever k^2. The lower extremity of the link k^4 is connected by a crank-arm k^8, affixed to the rock-shaft k^9. The rock-shaft k^9 is provided with two radially-projecting sears L L, one of which is shown in elevation in Fig. 1 in the position which the sears occupy when the loom is running normally, in which position each sear engages the rear extremity L' of one of the adjacent side members L^3. The arms L^2 extend transversely across and are affixed to the rock-shaft M. The forward ends of the arms L^2 afford the bearings for the whip-roller L^4. When the loom is running normally, the warp-threads *l* are maintained under proper tension and extend upward from the warp-beam *l'* over the whip-roller L^4, thence under the fluff-catching trough l^2, and upwardly therefrom across the lease-rods l^3, and through the heddles l^4 and the reed l^5 to the weaving-line of the fabric in process of being woven. If the shuttle fails to box properly, the link k^4 trips the sears L and thus releases the whip-roller frame, which thereupon drops from the position in which it is represented in solid lines in Fig. 1 to the position in which it is represented in dotted lines in said figure. This so greatly slackens the warp that there will be no breaking of the warp-threads even if the shuttle remains in the shed while the loom is coming to rest. This slacking of the warp only takes place when the loom is stopped by the failure of the shuttle to box properly.

What is claimed as the invention is—

1. The combination, in an upright loom, as herein set forth, of a spring-actuated progressively-acting stopping instrumentality, adapted to bring the operative parts of the loom to rest by its progressive action during a prescribed part of one revolution of the lay-driving shaft; a trip-lever for normally holding said stopping instrumentality out of action; a weft-fork and connections between said weft-fork and said stopping instrumentality, whereby if the weft-thread breaks or runs out the loom will be stopped with the lay down and the shed open.

2. The combination, in an upright loom, of a spring-actuated progressively-acting stopping instrumentality, adapted to stop the loom by its progressive action during a prescribed part of one revolution of the lay-driving shaft; a trip-lever for normally holding said stopping instrumentality out of action; a weft-fork and connections between said weft-fork and said trip-lever, whereby if a weft-thread breaks or runs out said trip-lever will be tripped at the conclusion of one beat of the lay, and the loom brought to rest before the lay can make another beat.

3. In an upright loom, the combination, as herein set forth, of a spring-actuated progressively-acting stopping instrumentality adapted to stop the loom by its progressive action during a prescribed part of one revolution of the lay-driving shaft; a trip-lever for normally holding said stopping instrumentality out of action; a weft-fork-carrying lever; a constantly-vibrating lever arranged in proximity to said weft-fork-carrying lever; a weft-fork pivotally mounted upon the free end of said weft-fork-carrying lever, and adapted to connect said weft-fork-carrying lever with said constantly-vibrating lever during the latter part of the beating motion of the lay if the weft-thread has run out or been broken; connections between said weft-fork-carrying lever and said trip-lever; a weighted detent adapted to engage a ratchet-wheel connected to the take-up roller for preventing said take-up roller from turning backwardly while the loom is in normal operation, and connections between said weft-fork-carrying lever and said detent, whereby the breaking or running out of the weft-thread effects the instant dis-

engagement of said detent from said ratchet-wheel, and concurrently trips into action the said progressively-acting stopping instrumentality.

4. The combination, in an upright loom, as herein set forth, of a spring-actuated progressively-acting stopping instrumentality adapted to bring the operative parts of the loom to rest by its progressive action during a prescribed part of one revolution of the lay-driving shaft; a weft-fork arranged at one side of the warp and connections between said weft-fork and said stopping instrumentality, whereby if a weft-thread breaks or runs out the loom will be stopped with the shuttle in the box adjacent to the side of the warp opposite that where the weft-fork is arranged.

ABRAM D. EMERY.

Witnesses:
ESTELLE M. EMERY,
E. GATTERER.