No. 705,913. Patented July 29, 1902.

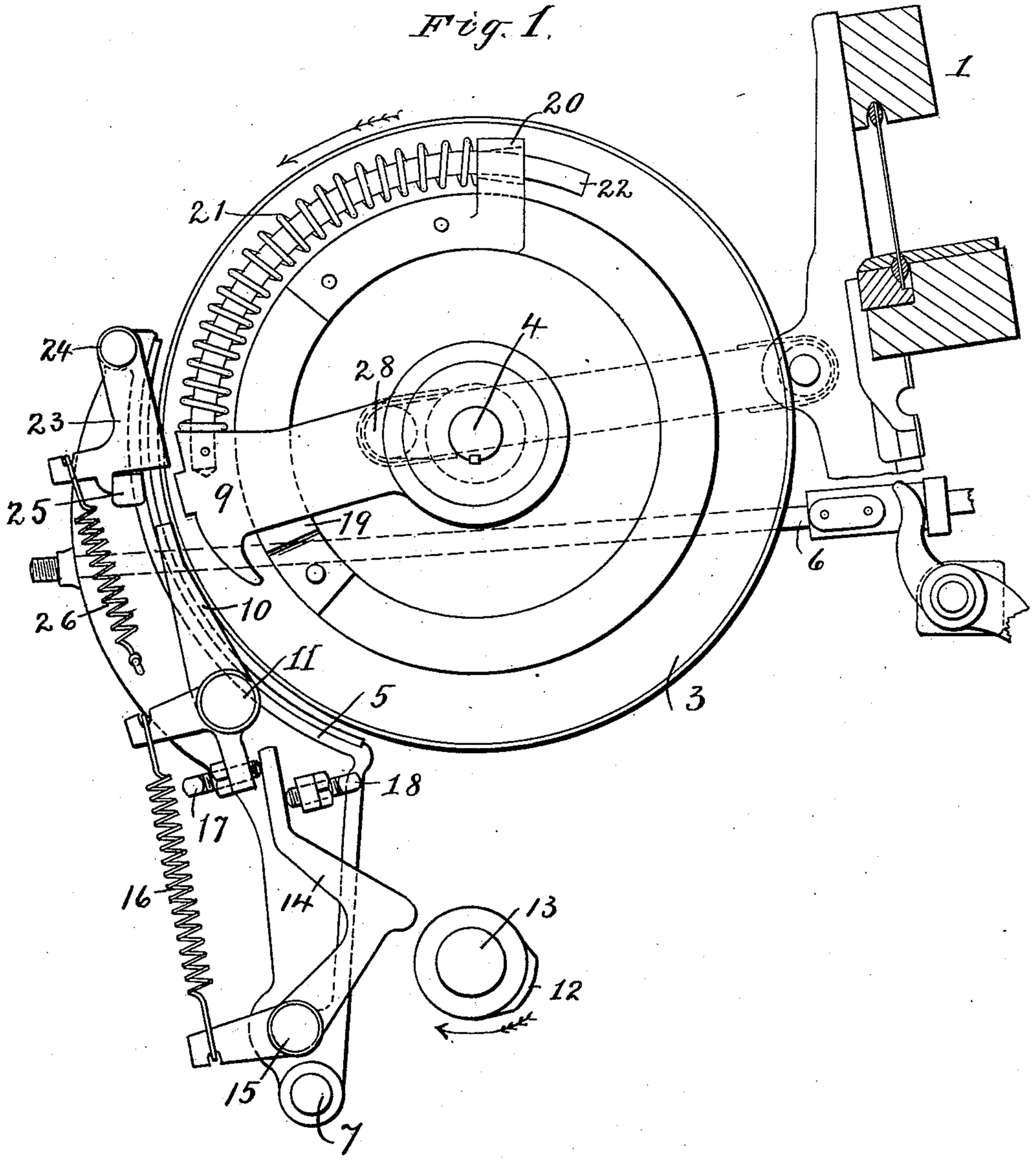
A. D. EMERY.

AUTOMATIC STOPPING MECHANISM FOR LOOMS.

(Application filed Apr. 7, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



Witnesses.
W. R. Edelin.
M. E. Torrence.

Inventor
Abram D. Emery
by Arthur A. Browne
his attorney

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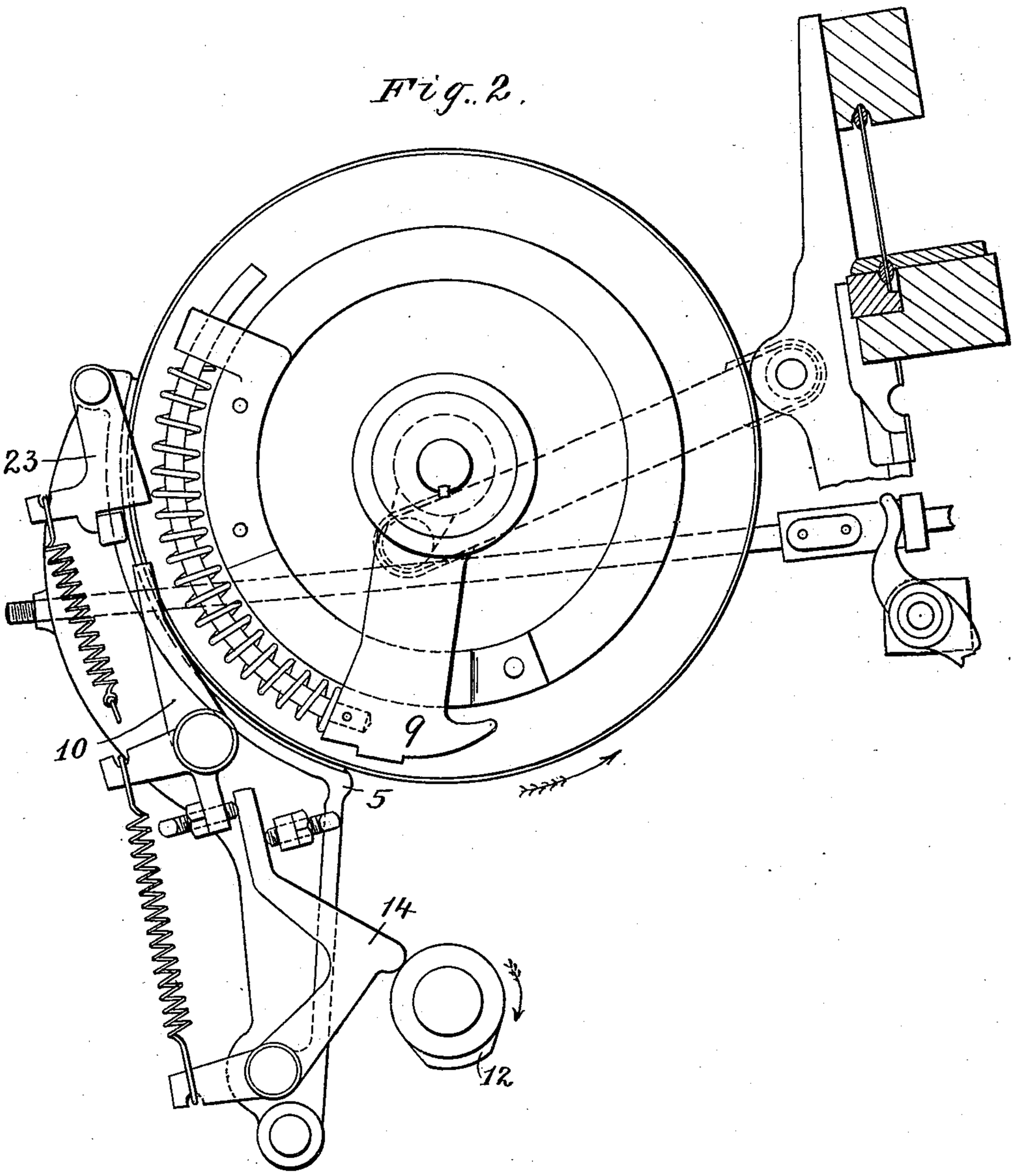
(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

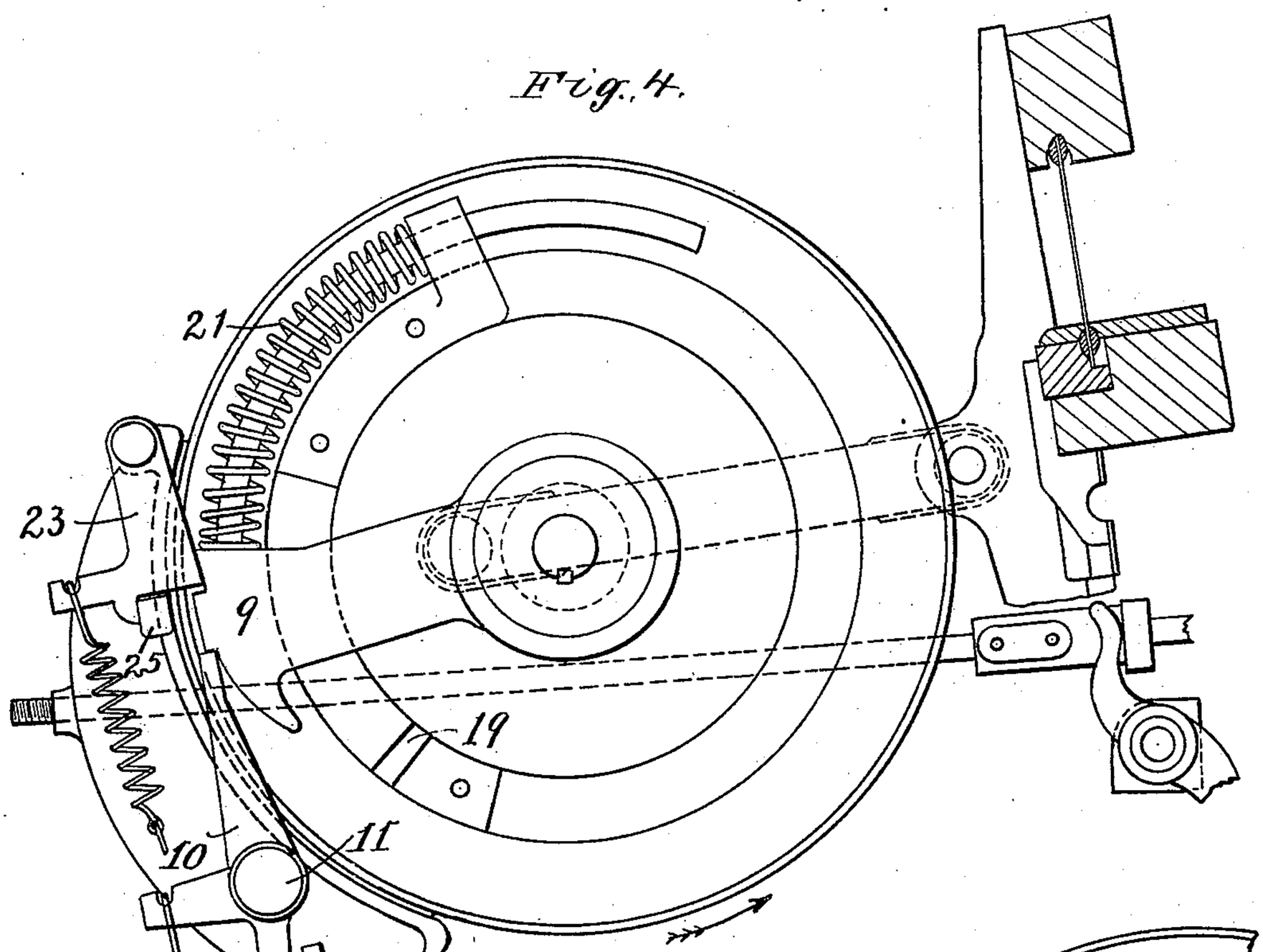

Fig. 3.

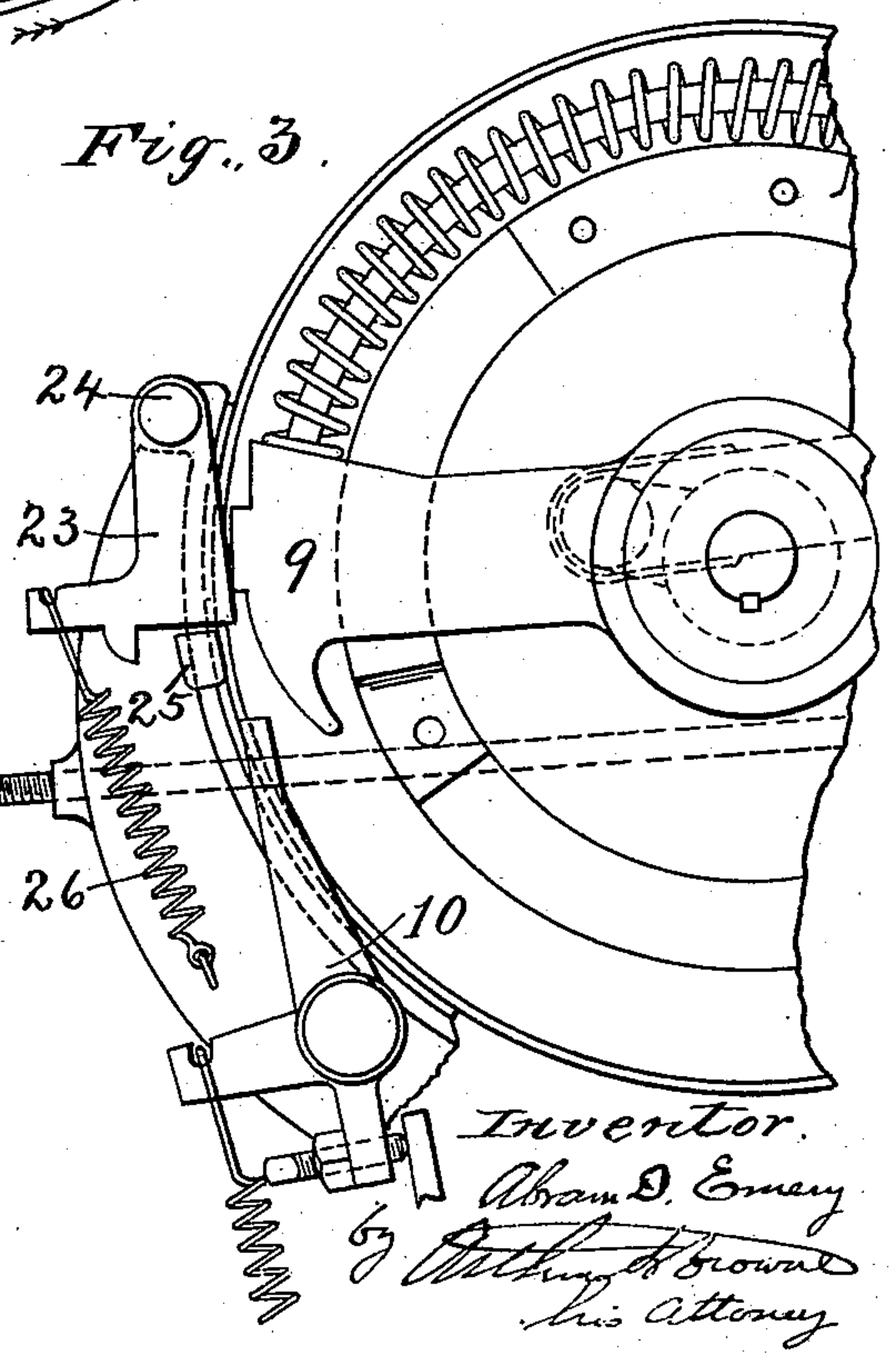

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Fig. 5.

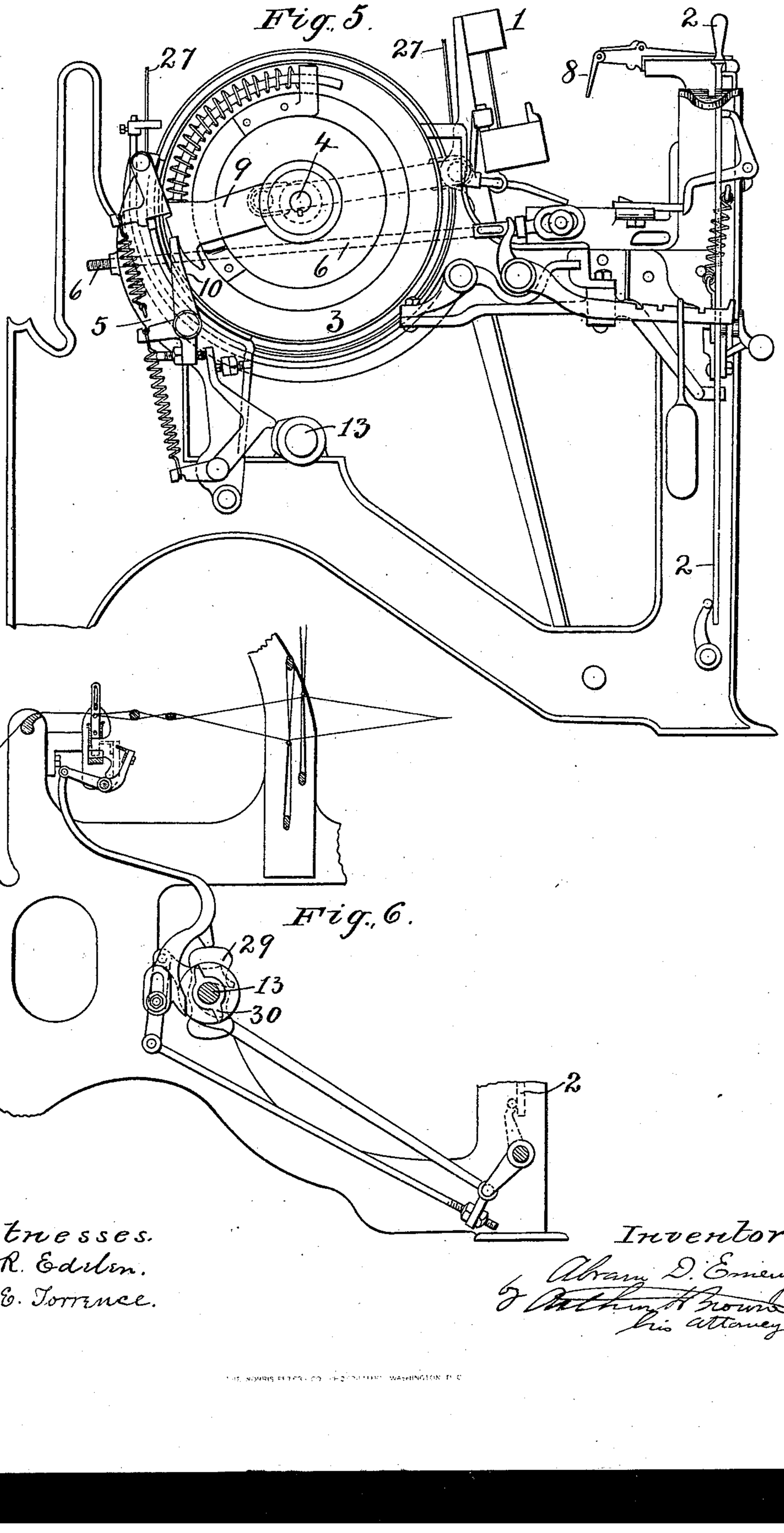

Fig. 6.

Witnesses.
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M. E. Torrence.

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UNITED STATES PATENT OFFICE.

ABRAM D. EMERY, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF PORTLAND, MAINE, AND HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

AUTOMATIC STOPPING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 705,913, dated July 29, 1902.

Application filed April 7, 1900. Serial No. 11,957. (No model.)

To all whom it may concern:

Be it known that I, ABRAM D. EMERY, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and Improved Automatic Stopping Mechanism for Looms, of which the following is a specification.

It is desirable in a loom that when its weaving mechanism stops the lay should come to a standstill in a definite position. For example, if the weaving mechanism of the loom stops on account of fault or failure of the weft or filling it is desirable that the lay should be brought to a standstill when at or near the "back center"—that is to say, when the lay is at or near the limit of its backward movement—*i. e.*, farthest away from the fell of the cloth. It is desirable that the lay should be thus stopped in this position, because when the weaving is again resumed it is important that the weaving mechanism of the loom should have reached approximately its working speed before the first pick of the shuttle in order that the shuttle may be properly driven the first time across the lay. This is of importance, especially in looms employing fast and loose pulleys, since it takes time for the driving-belt to be shifted from the loose to the fast pulley in starting the weaving mechanism, and hence the weaving mechanism does not instantaneously reach its working speed, and in any event whatever mechanism may be employed for starting the loom, whether fast and loose pulleys or clutches, owing to the inertia of the parts of the loom, which must be brought from a state of rest up to working speed, the attainment of effective speed requires time, and hence it is desirable that as much time should be secured as is practicable, so that the weaving mechanism may be running at high speed when the first pick is made. In this connection attention may be drawn to the familiar fact that if the shuttle is driven by a weak pick it will not arrive in the opposite box, but will be trapped in the shed, thus resulting in the knocking off and stopping of the loom through the action of the usual warp-protector provided for this purpose. Hence the importance of the weaving mechanism reaching a proper working speed before the first pick. In fast-running cotton-looms the picking is ordinarily effected when the lay is moving backward and is about half-way back. Consequently if the lay is substantially on the back center—that is to say, at or near the limit of its backward movement—when standing still it will on again being started move all the way forward and half-way back again before the pick takes place, thus securing a long interval in which to acquire the desired speed, and therefore it is desirable that the lay should stand still when substantially on the back center. This is desirable whether the weaving mechanism is started automatically, as in the case, for example, of the loom described in United States Letters Patent of George F. Hutchins, No. 466,525, dated January 5, 1892, or in United States Letters Patent, No. 626,860 granted to me June 13, 1899, or in case the weaving mechanism is started by the weaver, in which latter event it is customary for the weaver to assist in starting the weaving mechanism by taking hold of the lay-cap or hand-rail of the lay and pulling forward as the shipper-handle is moved to set the crank-shaft in motion. In fact, in the ordinary plain loom it is customary for the weaver in starting up the weaving mechanism to push the lay by hand back to near the back center before attempting to start up in order to secure the advantage of a long period of movement before the first pick occurs. By having the lay automatically stopped and brought to a standstill when substantially on the back center it is in the proper position for restarting. It is also desirable in plain looms that the lay should be stopped when near the back center, or at least before in its forward movement it reaches the point where the dagger encounters the frog, since the shuttle, which should then be boxed in one of the shuttle-boxes, is most conveniently reached.

The ordinary stopping mechanism with which a loom is provided does not act to stop the lay in any given position with any degree of certainty, the lay being as apt to stop in one place as in another. The ordinary stopping mechanism includes as a general rule shipping

mechanism which acts to shift the driving-belt from a fast to a loose pulley or to unclutch two clutch members, thereby stopping all of the portions of the loom, including the lay, which are controlled by the shipping mechanism, and also a brake which is brought into action by the shipping mechanism, which arrests the momentum of the moving parts controlled by the shipping mechanism and eventually brings them to rest. The momentum of the parts of the loom controlled by the shipping mechanism is great, especially in fast-running looms, and it is quite usual for the lay to make several reciprocations before it is brought to a stand by the action of the brake. The lay may thus come to a stand while a pick is being made, and since the pick under those circumstances is ineffective the shuttle will be driven only partly across the lay, thus becoming trapped in the shed. This is objectionable in case the shipping mechanism is restarted by hand, since it becomes necessary for the weaver to get the shuttle out of the shed, and it is particularly objectionable in case the weaving mechanism is automatically restarted after stopping a prescribed period of time, as in the case of the Hutchins patent, No. 466,525, or of my Patent No. 626,860, (both *supra.*) Attempts have been made to construct the brake so as to act more promptly, but it is difficult and almost impracticable to keep the brake adjusted for any considerable length of time so that it will act with any degree of certainty in stopping the lay in a particular place.

The object of the present invention is to equip the loom with mechanism which will bring the lay to rest at a definite position positively and with certainty whenever the shipping mechanism acts to stop the weaving mechanism. Preferably the improved device stops the lay when substantially on and a little past the back center.

The improved mechanism comprises an abutment which is carried on some moving part of the loom which has sufficient strength to withstand the force due to the stopping, (or some substantial moving part of the loom may itself constitute the abutment,) a stop which by the action of the shipping mechanism is automatically brought into the path of the said abutment preferably after the motive power has been cut off and after the brake has been applied, and a "back-stop" or "rebound-dog" which is brought into place behind said abutment or other moving part of the loom and limits the rebound, so that the abutment will encounter the stop and in coöperation with the rebound-dog will positively stop the lay with certainty in the desired definite position, the portions of the loom affected by the shipping mechanism having been preferably slowed down by the brake before the stop and rebound-dog act. When the weaving mechanism is about to be again started, the restarting movement of the shipping mechanism automatically removes the stop and rebound-dog from the abutment, thus leaving the weaving mechanism free to again start. Preferably means for cushioning the impact of the abutment on the stop are employed. It is desirable when the lay is stopped that the stopping should be effected when the lay is changing from reciprocation in one direction to reciprocation in the opposite direction, since it then has the least momentum and the stopping is most readily effected. It is desirable, therefore, to so time the abutment, stop, and rebound-dog relatively to the lay's movement that the abutment will encounter the stop and the rebound-dog will bring the lay to a standstill when the lay is near the back center, so that when the lay is to be again started forward to resume the weaving ample time is given before the first pick.

I prefer to stop the lay when substantially on the back center; but this is not necessary in all instances, since in some looms it is desirable to bring the lay to a standstill at a different position. For example, in filling-changing looms, in which the filling is automatically changed before the running shuttle becomes wholly exhausted through the instrumentality of a filling-feeler, (such as is shown in United States patent of George O. Draper, No. 527,014, dated October 2, 1894,) when equipped with a warp-stop the stoppages on account of weft failure are few as compared to those due to warp breakage, and in such looms it is desirable when the weaving mechanism stops that the lay should stop when the shed is closed, since it is then easiest for the weaver to locate the broken warp-thread. Hence in such looms it is preferable to set the abutment so that the lay shall stop forward of the back center at the point where the planes of the shed cross.

Wherever the lay is stopped after the shipping mechanism has acted to cut off the motive power, the movement of the lay is preferably checked by an initially-acting brake, and it is brought to a standstill by a subsequently-acting stop and rebound-dog. In some cases, however, it may be feasible to dispense with the brake and to rely upon the abutment, stop, and dog, when an ample range of cushioning movement is permissible.

For the purpose of illustrating the improvements I have selected what I now consider their best embodiment. This is shown in the accompanying drawings, in which—

Figures 1, 2, 3, and 4 are detail views of the stopping mechanism, showing the same in different positions. Fig. 5 is a side view of the loom, showing the stopping mechanism. Fig. 6 is a vertical section of a portion of the loom, showing a well-known warp-stop mechanism.

The drawings only show sufficient of the loom to enable the present improvements to be understood.

The loom illustrated has the usual lay 1, shipping mechanism of the usual character,

including a shipper-handle 2, a brake-wheel 3, which is shown on the crank-shaft 4, as usual, and a brake 5, operatively connected through the rod 6, so as to be applied when the shipping mechanism operates to stop the weaving mechanism either through fast and loose pulleys or through a clutch, the former being shown. The brake is shown as a lever turning on pivot 7. The particular shipping mechanism and its connection with the brake is of no importance; but for the purpose of illustration I have shown in Fig. 5 the mechanism set forth in United States patent to James H. Northrop, No. 593,070, dated November 2, 1897; also, in this figure there is shown the usual weft-fork 8, which may act in the usual way to effect the stoppage of the loom when the filling fails.

The final positive stoppage of the lay and other weaving devices is effected by an abutment 9, stop 10, and rebound-dog 23. The abutment may be on any moving part of the weaving mechanism sufficiently strong for the purpose or may be one of the usual structural parts thereof; but I prefer to mount it on one of the main rotary parts, since it is there more readily susceptible of proper positioning and may be given any desired range of movement during the stopping operation. The abutment is hence shown as carried around by the brake-wheel 3.

The location of the stop 10 is governed by that of the abutment, and the latter being on the brake-wheel the stop is conveniently mounted on the brake 5. The stop is preferably so arranged that it will not be brought into the path of the abutment by the applying movement of the brake alone in order that the brake may be given time to check the movement of the weaving mechanism before the stop comes into play. The stop is hence (see Fig. 1) constructed as a lever pivoted at 11 to the brake, and it is independently moved by its own actuator 12, which is shown as a cam on the usual low or cam shaft 13, which, as customary, rotates once for each two rotations of the crank-shaft. The actuator 12 does not immediately act upon the stop, but through the intermediation of a controller 14, which is shown as a lever pivoted at 15 to the brake. The stop 10 is restored outwardly to its idle position by a restoring-spring 16 and is limited in its outward movement by adjustable stud 17, carried by it, abutting against the end of controller 14. The controller 14 is normally held against adjustable stop-stud 18 on the brake by the same spring 16. The abutment 9 is preferably a radial arm swinging concentrically with the crank-shaft 4 and limited in its swing in opposite directions by the stop-blocks 19 and 20, carried by the brake-wheel. The abutment is held against block 19, so as to travel with the brake-wheel, by spring 21, which is interposed between the abutment 9 and the stop-block 20 and which surrounds a curved stem 22, which is secured at one end to the abutment and which at its other end slides through the block 20. This spring serves as the cushioning device to cushion the impact of the abutment and stop.

The back-stop or rebound-dog 23, beveled on its face toward the brake-wheel 3, is pivoted at 24 to the brake 5 and normally held against stop 25 on the brake by spring 26 and coöperates with the abutment 9 to prevent backward or rebounding movement of said abutment when the brake is applied.

The operation is as follows: When the loom is running, as shown in Fig. 1, the brake is off, the stop 10 and dog 23 are both out of the path of the abutment 9, and the cam 12 does not encounter the controller 14. When the shipping mechanism is brought into operation—as, for example, when the weft-stop acts—the motive power is cut off, as by shipping the drive-belt 27 (see Fig. 5) from the fast to the loose pulley, and the brake 5 is applied, as shown in Fig. 2. This movement of the brake does not bring the stop 10 into the path of the abutment, but does bring the beveled face of the dog 23 in the path of said abutment, and at the same time the controller 14 is brought into the path of the cam 12, as shown in Fig. 2. The brake having been applied the momentum of the parts carries them along until the cam 12 acts upon the controller 14, as shown in Fig. 4, thereby swinging said controller on its pivot 15, moving its upper end away from the stud 18, and thereby swinging the stop 10 on its pivot 11 into the path of the abutment 9, as shown in Figs. 3 and 4. Just before the abutment reaches the stop it encounters the beveled face of the dog 23, thereby swinging said dog on its pivot 24 outwardly away from stud 25 against the stress of its spring 26, as shown in Fig. 3; but just as soon as the abutment passes the dog the latter springs back into place, as shown in Fig. 4, behind the abutment, thereby offering an effective obstruction to the backward or rebounding movement thereof. Just after passing the dog the abutment encounters the stop 10, which prevents its further advance. Should there still be any momentum in the moving parts of the loom, the cushioning-spring 21 will then be compressed, as shown in Fig. 4, until the momentum is overcome. This compression, as shown in Fig. 4, carries the stop-block 19 beyond the abutment 9. It is possible that the loom will come to rest in this position if a sufficiently powerful brake is employed and its effectiveness is maintained. In the particular loom which has been selected for illustration and in general the brake is such that as soon as the momentum of the moving parts of the loom is fully overcome the spring 21 expands again, thus moving the loom backward until the stop-block 19 again encounters the abutment 9, which is prevented from partaking of this backward movement by the dog 23, except for the trifling extent due to the play (shown in Fig. 4) which the abutment has between dog 23 and stop 10. The

loom thus comes to a full standstill with the parts in the position shown in Fig. 5. When the loom is again started, the outward movement of the brake from the brake-wheel carries the stop 10 and the dog 23 out of the path of the abutment and the controller 14 away from the cam 12, so that the loom starts up just as though the improved stop devices were not on the loom.

As shown in the drawings, the abutment 9 and stop-block 19 are so located relatively to the lay-operating cranks 28 (see Fig. 1) that when the loom comes to a stand the lay is substantially all the way back. Also the blocks 19 and 20 are so located that the compression of the cushioning-spring 21 occurs when the lay-cranks are passing the center, at which time the momentum of the loom is at its minimum, thus facilitating the stopping.

It will be further noted that two independent actions are necessary to bring the stop 10 into the path of the abutment—first, the application of the brake, and, second, the action of the cam 12 on the controller 14. Consequently it is possible to properly time the stopping of the weaving mechanism with any other action of the loom, so as to secure any desired result. In case, for example, the stopping mechanism is actuated by the weft-fork (by reason of fault in the weft) it is usual to arrange the weft-hammer to actuate the shipping mechanism and apply the brake when the succeeding pick takes place or just after. I prefer to apply the brake at this time, but to arrange the stopping mechanism so that the lay will complete the next forward stroke, move back and make another pick, and as it then completes its backward movement the abutment encounters the stop, which in the meanwhile has been moved into operative position by the cam 12, which is so set on the cam-shaft 13 relatively to the weft-hammer-actuating cam as to secure this result.

When the loom is stopped, the weaver can turn it by hand by simply releasing the brake by the hand controlling devices ordinarily used. This results in moving the stop and dog out of the way just the same as in restarting.

It is obvious that these improvements may be employed in any loom where it is desired to stop the lay with certainty in a given place and also wherever the weaving mechanism is to be automatically restarted.

In case the loom is provided with a warp-stop the loom can be stopped so as to leave the lay standing in such position that the planes of the shed are in line by simply adjusting the cam 12 properly with reference to the cams which belong to the warp-stop. I have shown in Fig. 6 an appropriate warp-stop mechanism, which is the same as that shown in United States Letters Patent to George O. Draper, No. 622,183, dated March 28, 1899, and which hence does not here require detail description. As here shown, the cams 29 30 of the warp-stop mechanism are on the cam-shaft 13, so that by proper relative arrangement between them and the cam 12 the lay will come to a stand in the desired place.

I claim as my invention—

1. A loom having, in combination, a rotary abutment, a brake-wheel, a brake movable to and from said brake-wheel, a stop carried by and movable with said brake, and a cam which acts to move said stop into the path of said abutment after said brake has been applied.

2. A loom having, in combination, shipping mechanism, a brake controlled by said shipping mechanism, a stop which positively stops the motion of the parts of the loom affected by the shipping action of the shipping mechanism after the brake is applied, and a rebound-dog which limits the rebound of the said parts of the loom.

3. A loom having, in combination, shipping mechanism, a brake controlled by said shipping mechanism, an abutment on a moving part of the loom, a stop which positively encounters said abutment after the brake has acted, and a rebound-dog which limits the rebound of the moving parts of the loom controlled by the shipping mechanism.

4. A loom having, in combination, a rotary abutment, a brake, a spring-pressed rebound-dog on said brake, a stop on said brake, and shipping mechanism connected with said brake, whereby when the shipping mechanism acts the dog and stop are moved toward the path of said abutment.

5. A loom having, in combination, a moving abutment, shipping mechanism, a cam or tappet, and a stop which is moved by the action of said shipping mechanism into the path of said cam or tappet, and is thereby moved into the path of said abutment.

6. A loom having, in combination, a moving abutment, shipping mechanism, and a rebound-dog which is moved by the action of the shipping mechanism into coöperative relation with said abutment.

7. A loom having, in combination, shipping mechanism, a moving cam or tappet, a moving spring-pressed abutment, a lever coöperatively connected with said shipping mechanism so that when said shipping mechanism acts it moves toward said abutment and a stop and a spring-pressed rebound-dog carried by said lever, the movement of said lever toward the abutment bringing said rebound-dog into the path of said abutment, and the said stop into coöperative relation to said cam or tappet, which thereupon moves said stop into the path of said abutment.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ABRAM D. EMERY.

Witnesses:

GEORGE OTIS DRAPER,

ERNEST WARREN WOOD.