No. 654,915. Patented July 31, 1900.

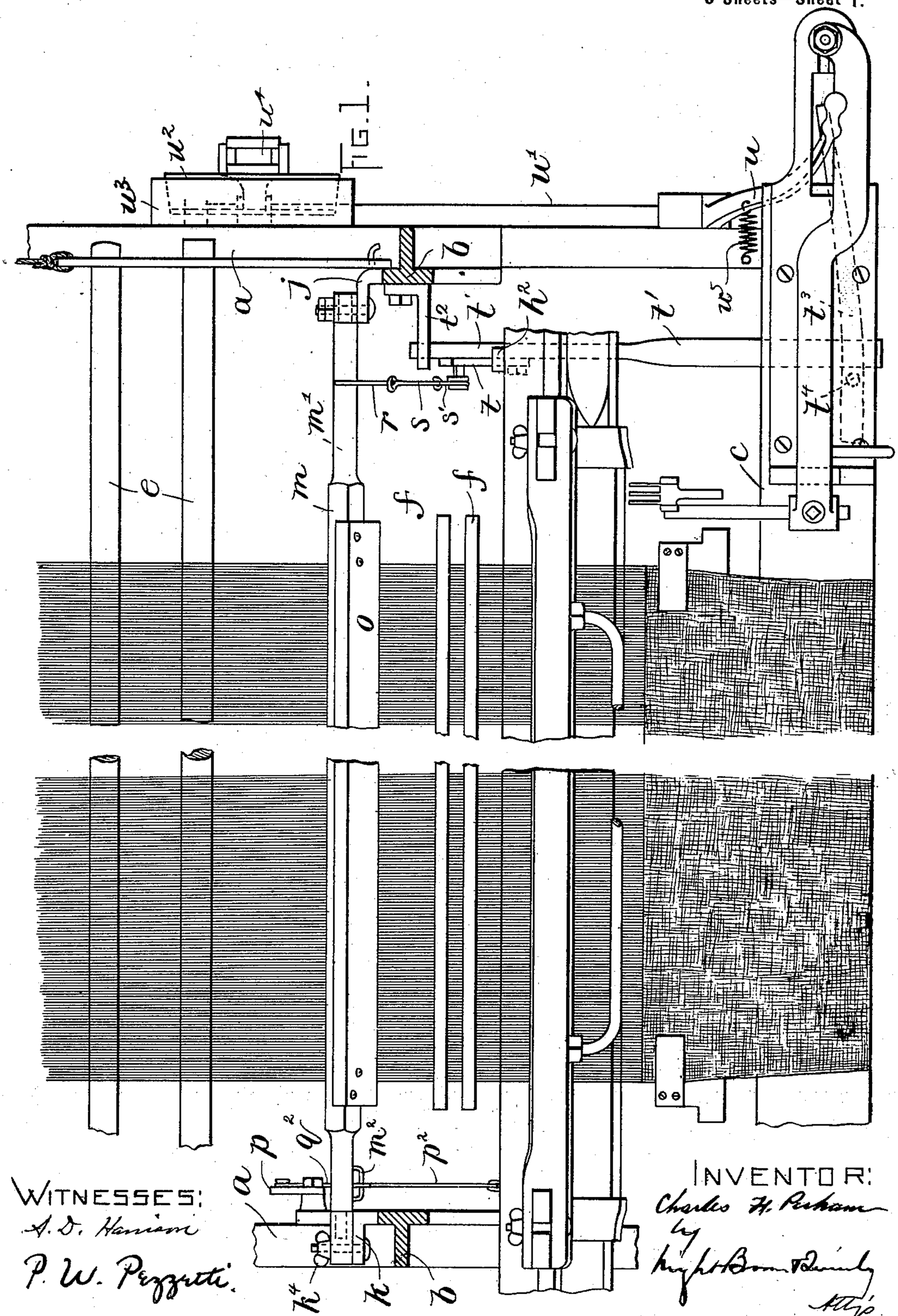
C. F. PERHAM.

LOOM.

(Application filed Nov. 4, 1896. Renewed May 31, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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(No Model.) 3 Sheets—Sheet 2.

FIG. 2.

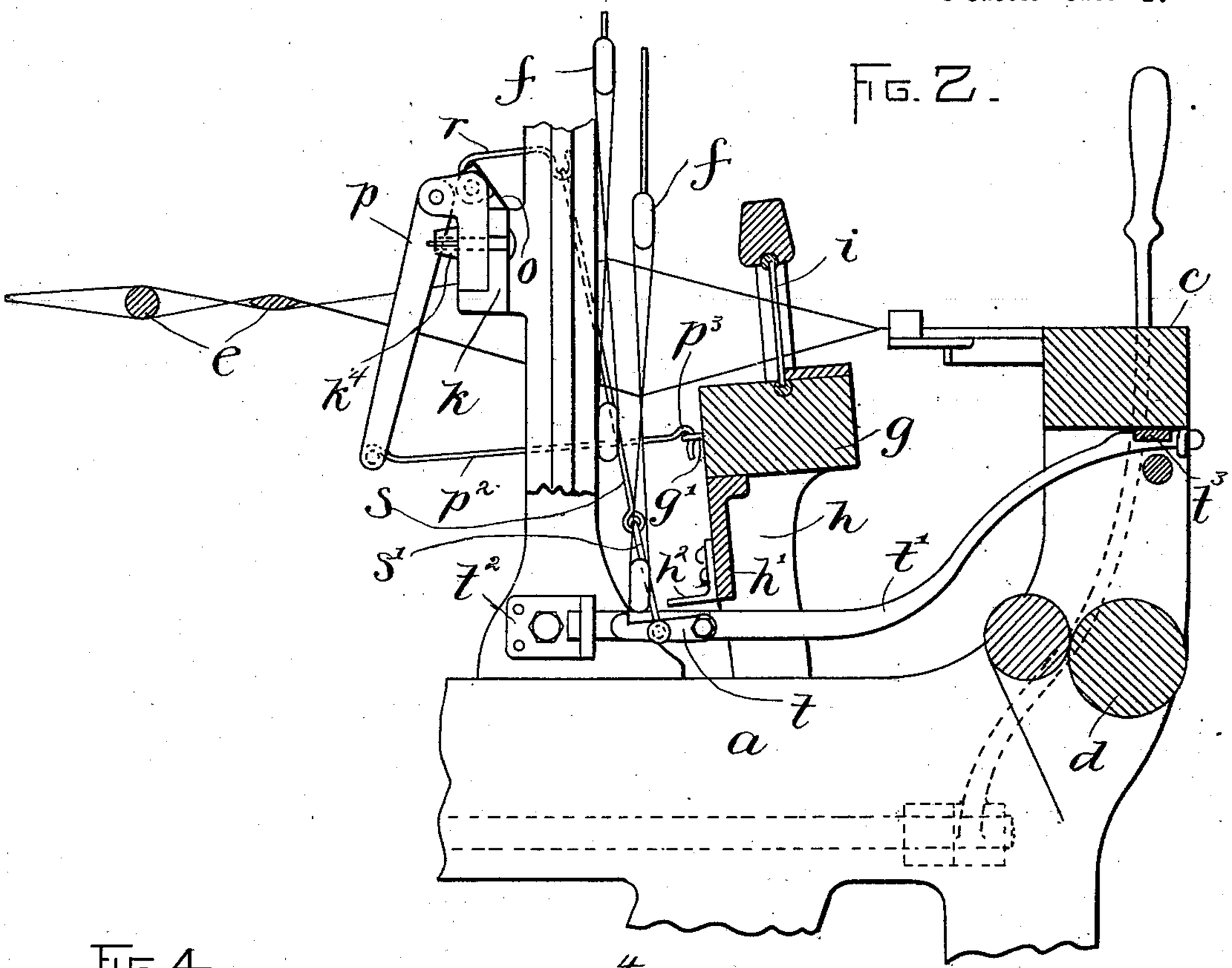
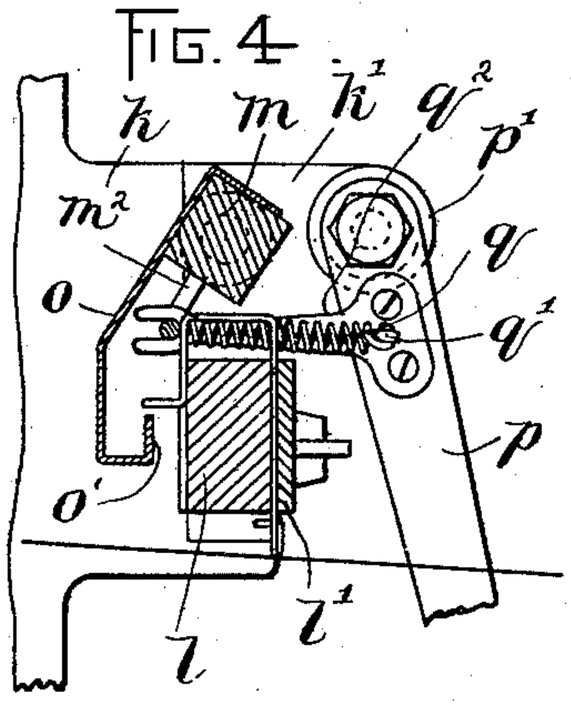


FIG. 4.



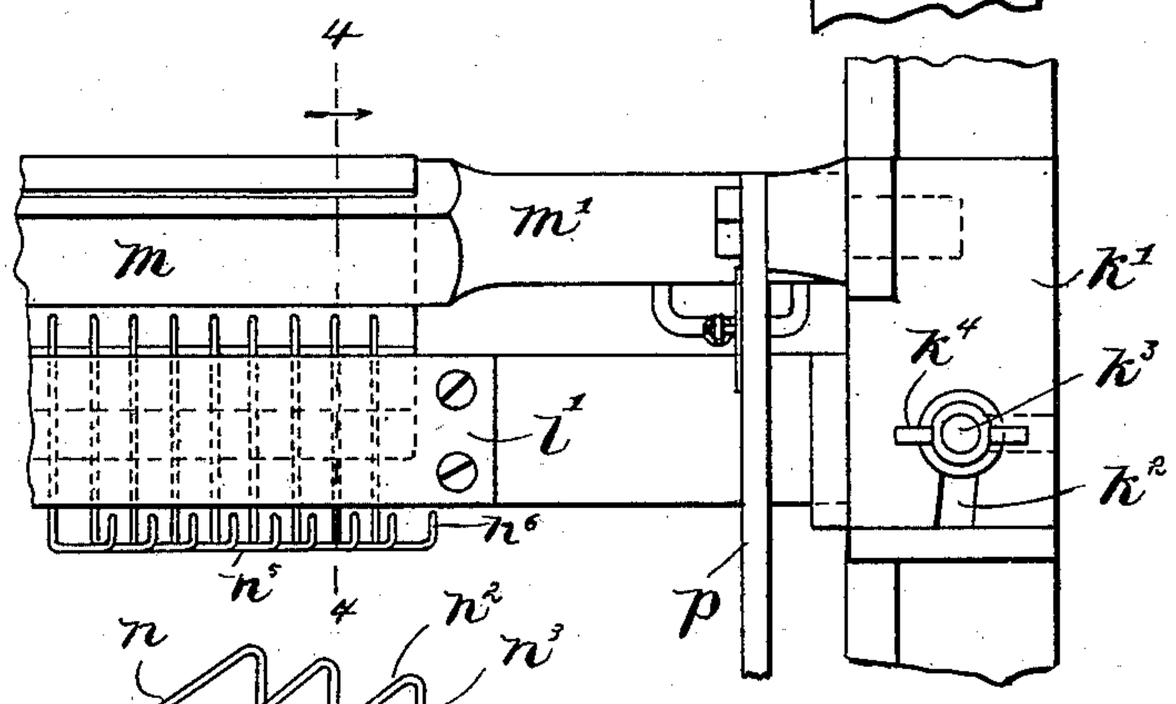
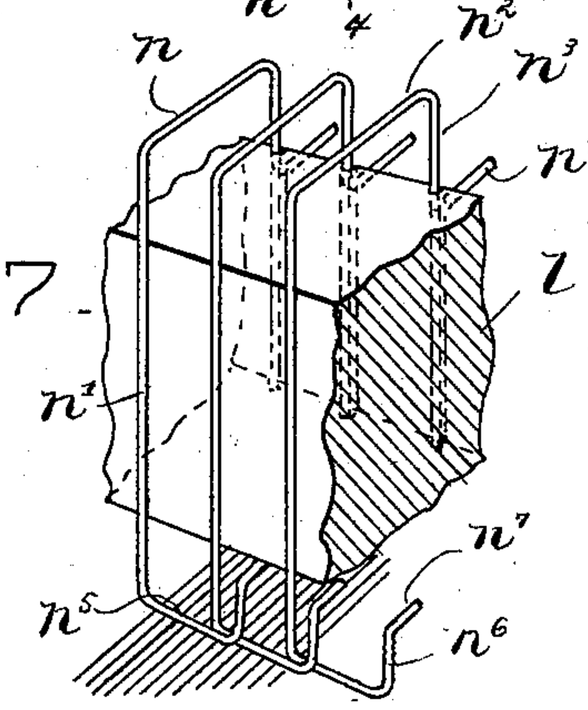


FIG. 3.

FIG. 7.



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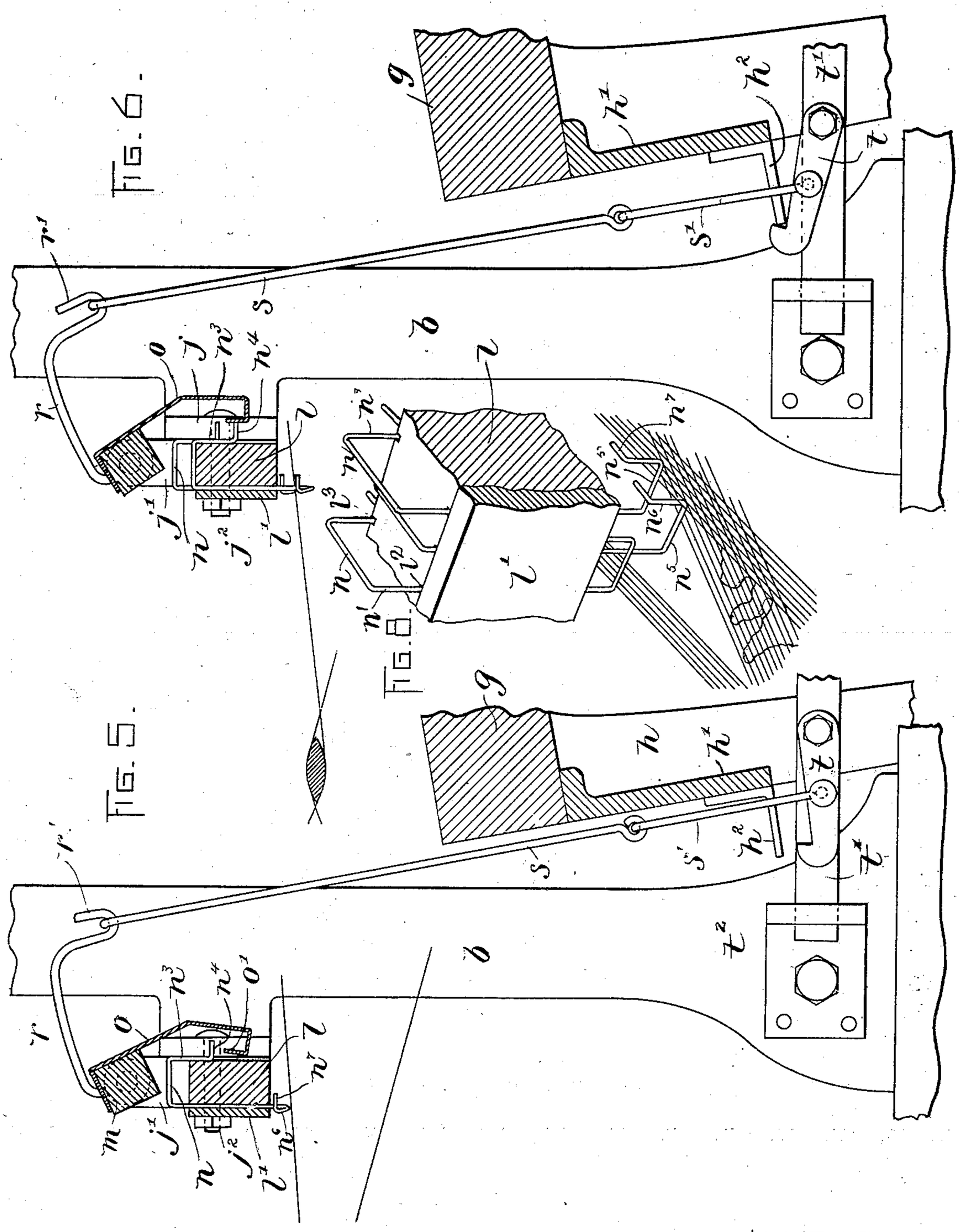
(No Model.) 3 Sheets—Sheet 3.

FIG. 6.



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UNITED STATES PATENT OFFICE.

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LOOM.

SPECIFICATION forming part of Letters Patent No. 654,915, dated July 31, 1900.

Application filed November 4, 1896. Renewed May 31, 1900. Serial No. 18,638. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FOSTER PERHAM, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Looms, of which the following is a specification.

This invention relates to looms, and has for its object to provide an improvement in the same for cutting off power from the power-shaft when one or more of the warp-threads are broken or become entangled, so as to cause what is termed a "float."

To this end the invention consists of a device for acting on the shipper to disconnect the power-shaft from the power-supply and constructed and arranged to be operated either by the breaking of one or more warp-threads in case relatively-large threads are used or to operate when the warp-threads are entangled with a broken thread, so as to cause a float, all as I shall now proceed to describe in detail and then point out in the claims hereto annexed.

Reference is to be had to the accompanying drawings, and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 is a plan view of the loom, parts being broken away, showing my improvements. Fig. 2 is a vertical longitudinal section through the same, parts being shown in side elevation. Fig. 3 is a rear elevation of a portion of my float-detector. Fig. 4 is a vertical cross-section through the same on the line 4 4 of Fig. 3, showing the parts in the normal positions which they occupy when the warp-threads are all intact. Fig. 5 is an enlarged view illustrating the position of the latch connected with the shipper when the threads are unbroken. Fig. 6 is a similar view, but showing the position assumed by the parts in case there is a broken warp or a float. Fig. 7 is a perspective view of the detectors and their supporting-beam. Fig. 8 is a similar perspective view showing one of the feelers as having dropped by reason of the threads being tangled.

I have illustrated only a portion of a loom, and it will be understood that my invention is not limited to the details of construction thereof, since it may be applied to a loom of any style or kind.

On the drawings the loom is shown as having side standards *a*, connected by an arch *b*, a breast-beam *c*, take-up rolls *d* for the cloth, lease-rods *e e*, and harnesses *f f*, all of which may be similar to those now usually employed.

The lay-beam *g* is supported on swords *h*, carries the reed *i*, and operates in the usual way.

Projecting rearwardly and laterally from each standard of the arch *b* is a bracket *j* or *k*, a bearing-block *j'* being secured to the bracket *j* and a bearing-block *k'* being secured to the bracket *k*. In the said bearing-blocks is mounted a bar or beam *l*, which supports the detectors, to be hereinafter described, and directly above the said bar or beam is journaled a shaft *m*, having cylindrical ends *m'*, the body of the shaft being square in cross-section. Preferably the bearing-block *j'* is pivoted to the bracket *j* by a hinge-pin j^2, (shown as a bolt,) and the bearing-block *k'* has a slot k^2 to receive a bolt k^3, provided with a wing-nut k^4. Normally the bolt and nut lock the bearing-block *k'* firmly to the bracket *k;* but they may be loosened so as to swing the bar *l* and the shaft *m*, with the bearing-block *k'*, around the hinge-pin j^2, which passes through the bearing-block *j'* and the bracket *j*. The bar *l* is arranged just above the warp-threads, which are carried upward by the heddles to form the shed for the shuttle, and between the said bar *l* and a strip *l'*, secured thereto, are placed a number of vertically-movable float-detectors *n*. Each detector is formed of a wire bent to have a vertical portion *n'*, sliding in a groove l^2 in the bar *l* or the strip *l'*, a horizontal portion n^2 passing above the bar *l* and to the front, a short downwardly-extending portion n^3 sliding in grooves l^3 in the front face of the bar *l*, and a forwardly-projecting end n^4 extending at right angles to the front face of the bar *l*. The lower end n^5 of the vertical portion *n'* is bent laterally and at right angles to the portion n^2 and parallel with the bar *l*, being then bent upward, as at n^6, and forward, as at n^7, so as to extend under the bar *l* and limit the upward movement of the detector. The de-

tectors are arranged so closely together that the horizontal portions n^5 overlap each other and rest loosely upon those warp-threads which are elevated by one of the harnesses. As the warp-threads are alternately elevated and depressed by the harnesses the warp-detectors rise and fall with them, dropping downward when one set of threads is depressed and rising upon the alternate threads when they are elevated.

Projecting downward from the square shaft m is a feeler o, consisting of a long metallic strip extending the entire length of the detectors across the warp. It has an upwardly-projecting edge o', which when the warp-threads are in unbroken condition and the detectors are elevated is adapted to pass under the forwardly-projecting ends n^4 of the warp-detectors, as shown in Figs. 4 and 5.

The shaft is provided with a downwardly-projecting arm m^2, which is yieldingly connected by means to be described with a lever p, fulcrumed in a lug p', projecting rearwardly from the bearing-block k'. The lower end of the lever p is connected by a link p^2 with the lay-beam g, the link p^2 having on its forward end a hook p^3, passing through an eye g' on the lay-beam. The means connecting the lever p with the arm p^2 of the shaft m consist of a tension-spring q, having one end connected to the arm m^2 and the other end connected to an eye q' on the arm p', and the link q^2, secured to the lever p and having a forked end bearing against the bent end of the arm m^2. Thus it will be seen that as the lever p is drawn forward by the lay-beam g the arm m^2 will be forced forward by the link q^2, and when the lay-beam moves backward the spring q will be drawn backward by the lever p, so as to draw the arm m^2 backward also. Thus the shaft m is rocked positively in one direction and is rocked yieldingly in the other direction, so that if it is locked against motion the lever p may be reciprocated by the lay-beam without breaking any of the parts.

The end of the shaft m opposite that from which extends the arm m^2 is provided with a forwardly-projecting arm r, having on its free end a hook r', the said hook being connected by links $s\,s'$ with a dog t on a bar t', having its rear end mounted slidably in a bracket t^2 on the arch b and having its other end engaged with a lever t^3, fulcrumed underneath the breast-beam by a pin t^4. The shipper-lever u is mounted on the shipper-shaft u', by means of which the clutch u^2 for imparting power from the belt-wheel u^3 to the power-shaft u^4 is operated and the power is supplied to and disconnected from the operating parts of the loom. The end of the lever t^3 bears against the shipper-lever, which when the power is applied to the power-shaft of the loom lies in a notch in a bracket on the breast-beam, so that if the end of the said lever t^3 be moved inward it will lift the end of the shipper-lever out of the notch and a strong spring u^5 will draw the shipper-lever forward, so as to unclutch the driving-wheel from the power-shaft.

The swords of the lay-beam have a cross-bar h', provided with a finger h^2, arranged to engage the dog t when the latter is raised, as I shall hereinafter describe.

The operation of the parts is as follows: The vibration of the lay-beam causes the oscillation of the arm p, which in turn rocks the shaft m in its bearings. The feeler o, which is connected with the shaft m, vibrates through an arc a little greater in length than the length of the bent ends n^4 of the float-detectors, so that when the lay-beam is in its rearmost position the edge o' of the strip bears against the bar l, and when the lay-beam is in its foremost position the edge o' will be moved away from the bar l, so as to lie in a vertical plane a short distance in front of the ends n^4. As the lay-beam moves forward to accomplish its work the harnesses are operated in opposite directions, so that while the feeler o is in its forward position the float-detectors resting loosely on the warp-threads drop with one set of threads behind the edge o' and are elevated by the next set of threads before the lay-beam reaches its rear position. If it should happen that one of the warp-threads becomes entangled with those adjacent to it, so as to cause a float, that float-detector which is directly over the entangled threads will drop, as shown in Figs. 6 and 8, while the lay-beam is forward, so that when it moves backward the edge o' of the feeler o will come in contact with a projecting end n^4 of the float-detector and be prevented from vibrating. Therefore the arm r will be held in an elevated position and the dog t will be supported in its raised position to receive the finger h^2 on the lay-beam, so that as the lay-beam moves backward it will carry with it the bar t', thereby rocking the lever t^3 on its axis and disengaging the shipper-lever, so as to unclutch the driving-wheel from its shaft and stop the loom from operating. Thus it will be seen that the instant one of the warp-threads becomes sufficiently entangled with its adjacent threads to cause a float, the loom will cease operating and notify the attendant that something is wrong. It will be also seen that the bent portions n^5 of the float-detectors which rest upon the warp-threads overlap each other to a considerable extent, so as to prevent any of the threads from slipping between them.

In practice each of the detectors rests upon from five to seven warp-threads, and consequently it would not operate to stop the loom until that number became entangled; but it is evident that the number of threads for each detector may be varied. It will be likewise understood that, if desired, when working with coarse yarn there may be a single detector for each warp-thread, so that the loom will be brought to a standstill upon the breaking of a single thread; but I have shown the de-

tectors as not operated by the breaking of a single thread, since in weaving print-cloths and other fabrics it is frequently the case that the breaking of a single warp-thread, unless it causes a float, is not deleterious and does not materially injure the cloth.

By employing a yielding connection between the lever *p* and the arm m^2 of the rock-shaft *m* the rock-shaft may be held from movement without affecting the operation or movements of the said lever *p*.

By supporting the detectors upon the bar *l* in the rear of the harnesses they are entirely independent of the heddles and the other parts of the harness and do not require the movable parts of the loom to be specially prepared. They are always entirely above the upper threads in the shed, and being easy of access may be removed and replaced with great ease and without affecting the operation of the loom or without changing any of the operative parts thereof. By having their lower ends resting loosely on the threads they do not tend to strip the sizing from the latter or injure them in any way.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. In a loom, the combination with means for disconnecting the power from the operative parts of the loom, of a series of detectors mounted independently of the lay and the harness and arranged above the warp-threads and having their lower ends resting loosely on the upper threads of the shed, a support above the warp in the rear of the harness for said detectors and means coacting with said detectors and operated by one of the moving parts of the loom for actuating the disconnecting means, when the warp-threads break or become entangled.

2. In a loom, the combination with means for disconnecting the power from the operative parts of the loom, of a harness, a lay adapted to actuate the said means, detectors each arranged to connect the said device and the said means so as to effect the stoppage of the loom when the warp-threads are broken or entangled, said detectors each resting loosely at their lower ends upon two or more threads and a support located above the warp in the rear of the harness for said detectors.

3. In a loom, the combination with means for disconnecting the power from the operative parts of the loom, of a series of detectors having their lower ends resting loosely on the warp-threads and arranged to connect the lay with said disconnecting means, when the warp-threads break or become entangled, to operate said disconnecting means, said detectors being mounted independently of the lay and the harnesses and a support for said detectors located above said warp in the rear of the harness.

4. In a loom, the combination with means for disconnecting the power from the operative parts of the loom, of a dog connected with said disconnecting means, a lay-beam, a series of detectors mounted independently of the lay-beam and the harnesses and having their lower ends resting loosely upon the warp-threads and arranged to move said dog into the path of the said beam when said warp-threads are broken and become entangled and a support for said detectors located above said warp in the rear of the harness.

5. In a loom, the combination with means for disconnecting the power from the operative parts of the loom, of a dog connected with the disconnecting means, a lay-beam, a feeler connected to said dog and operated by said beam, a series of detectors having their lower ends resting loosely upon the warp-threads and coacting when the warp-threads break or become entangled with the feeler to move said dog into the path of the lay-beam and a support for said detectors located above said warp in the rear of the harness.

6. In a loom, the combination with the shipper, the lay-beam, and a dog for operating said shipper arranged to lie out of the path of the lay-beam, of a feeler connected to the device and reciprocated by the said lay-beam, a series of detectors each having a bent lower end to rest loosely upon the warp-threads, and arranged to drop into the path of the feeler when the threads become broken or entangled, and to thereby cause the feeler to hold the dog in the path of the lay-beam for the purpose described and a support for said detectors located above said warp in the rear of the harness.

7. In a loom, the combination with a lay, and means for disconnecting the power from the loom, of a series of float-detectors, each formed of a wire having a bent lower end resting upon the warp-threads and arranged to cause the actuating of the disconnecting means and a support for said detectors located above said warp in the rear of the harness.

8. A float-detector formed of wire and having a horizontal portion to rest on the thread transversely thereof, a vertical portion, and an end projecting forward parallel with the warp-threads in combination with a feeler, and mechanism coacting with said feeler to stop the loom as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 22d day of October, A. D. 1896.

CHARLES FOSTER PERHAM.

Witnesses:

A. D. HARRISON,

P. W. PEZZETTI.