Sept. 4, 1928. 1,683,214

R. G. TURNER

WEFT DETECTOR IN REGULARLY MOVING TRANSFERRER

Filed July 3, 1926 2 Sheets-Sheet 1

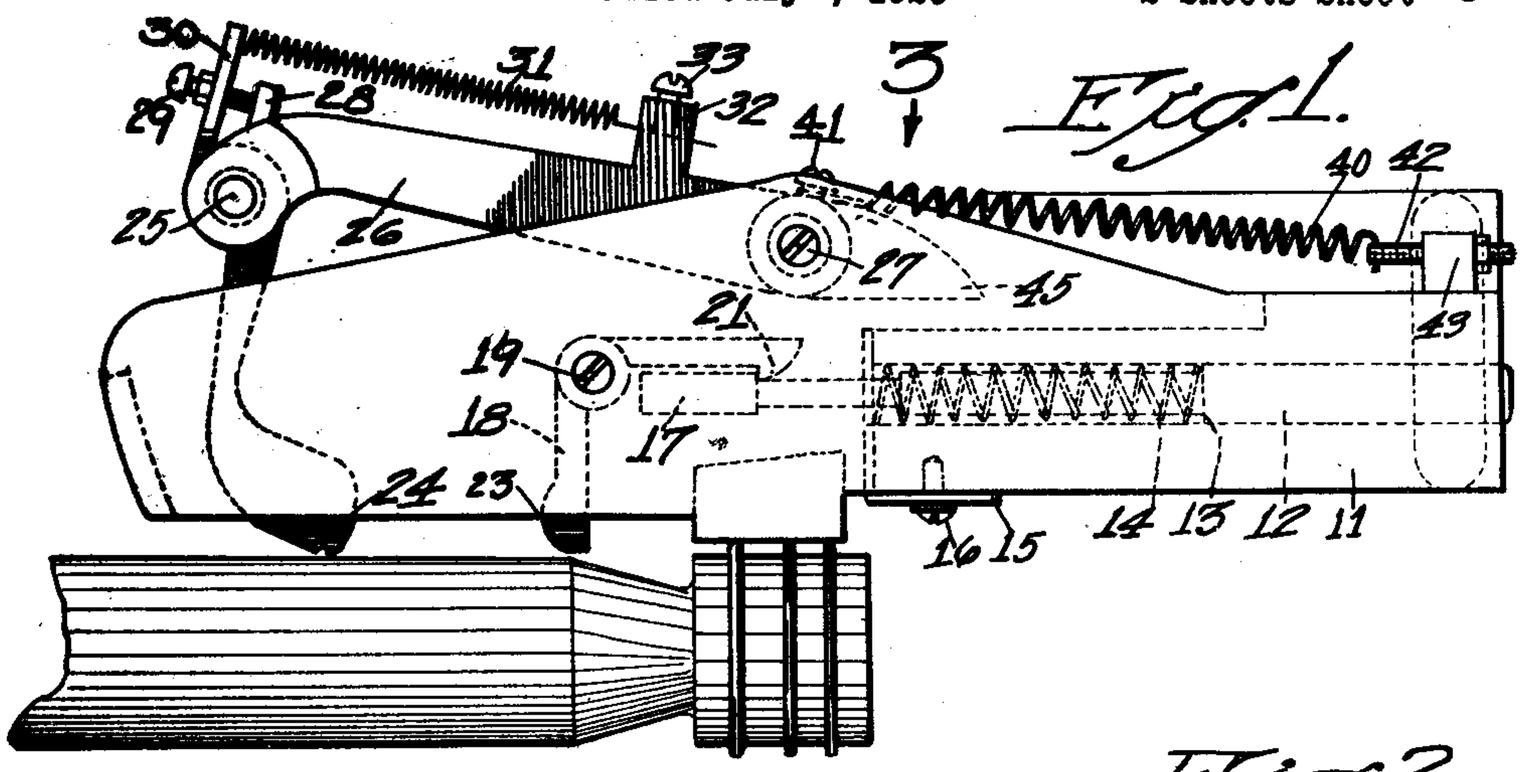

Fig. 1.

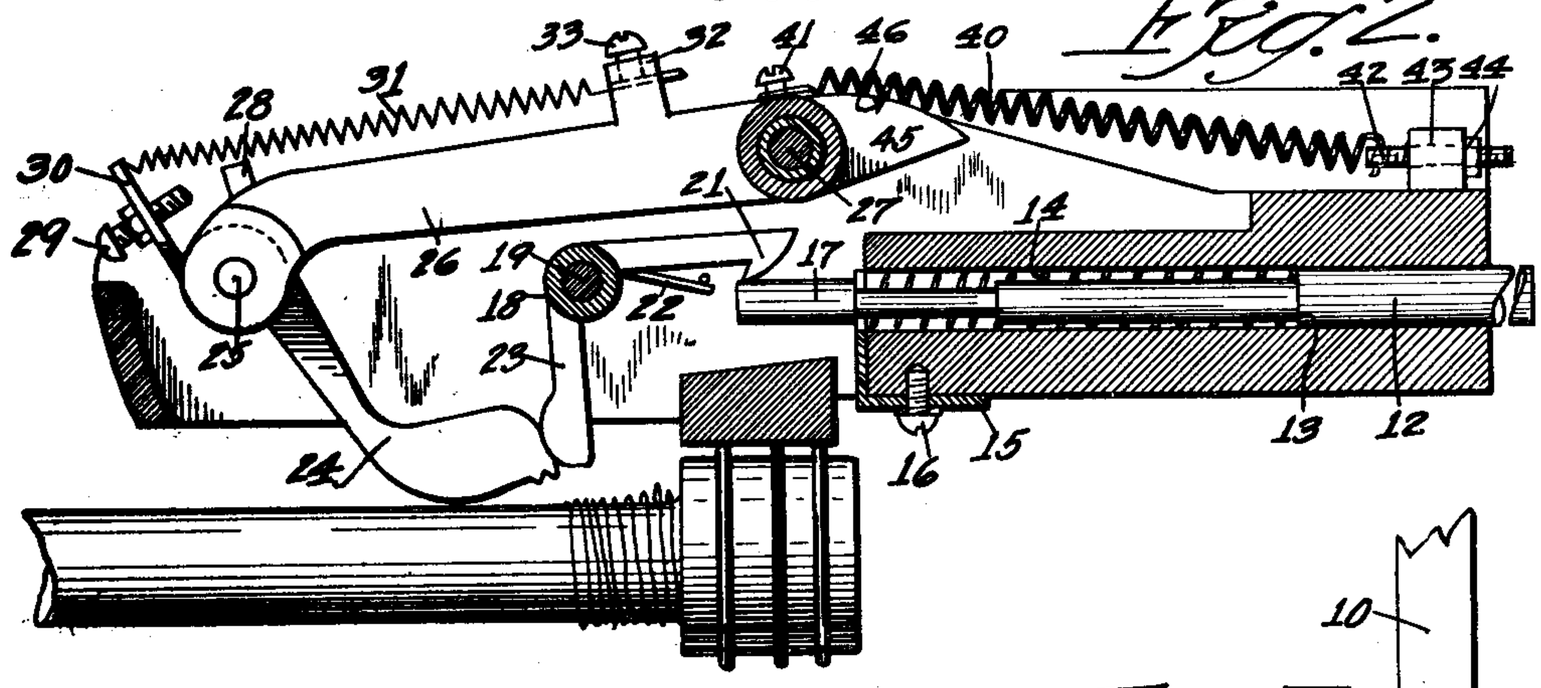

Fig. 2.

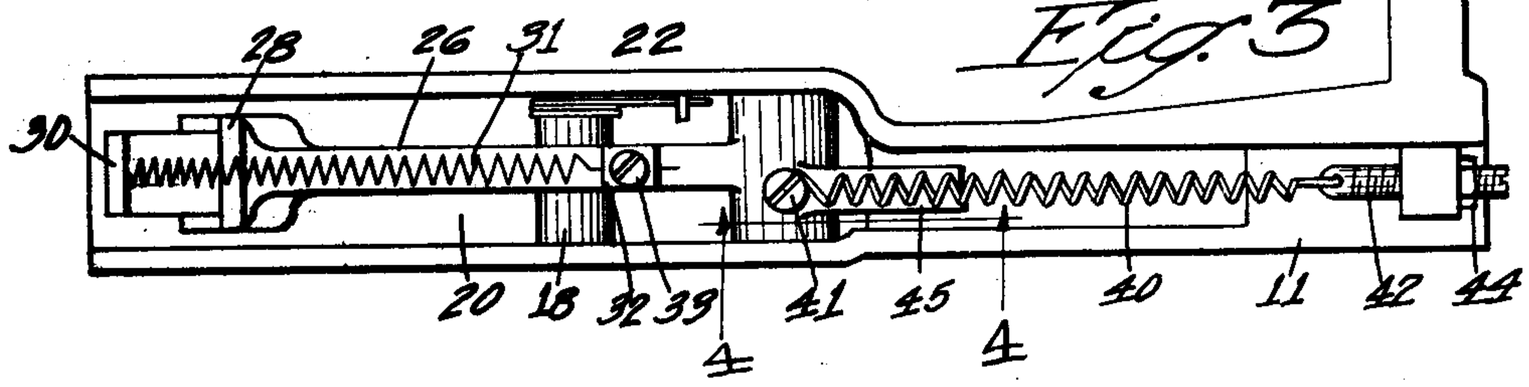

Fig. 3

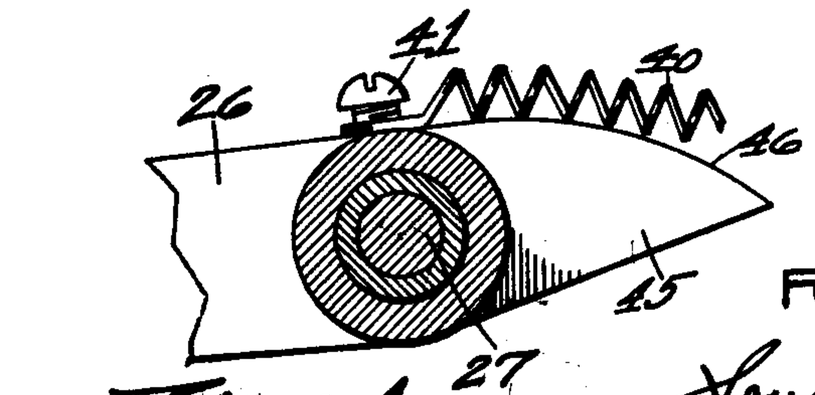

Fig. 4

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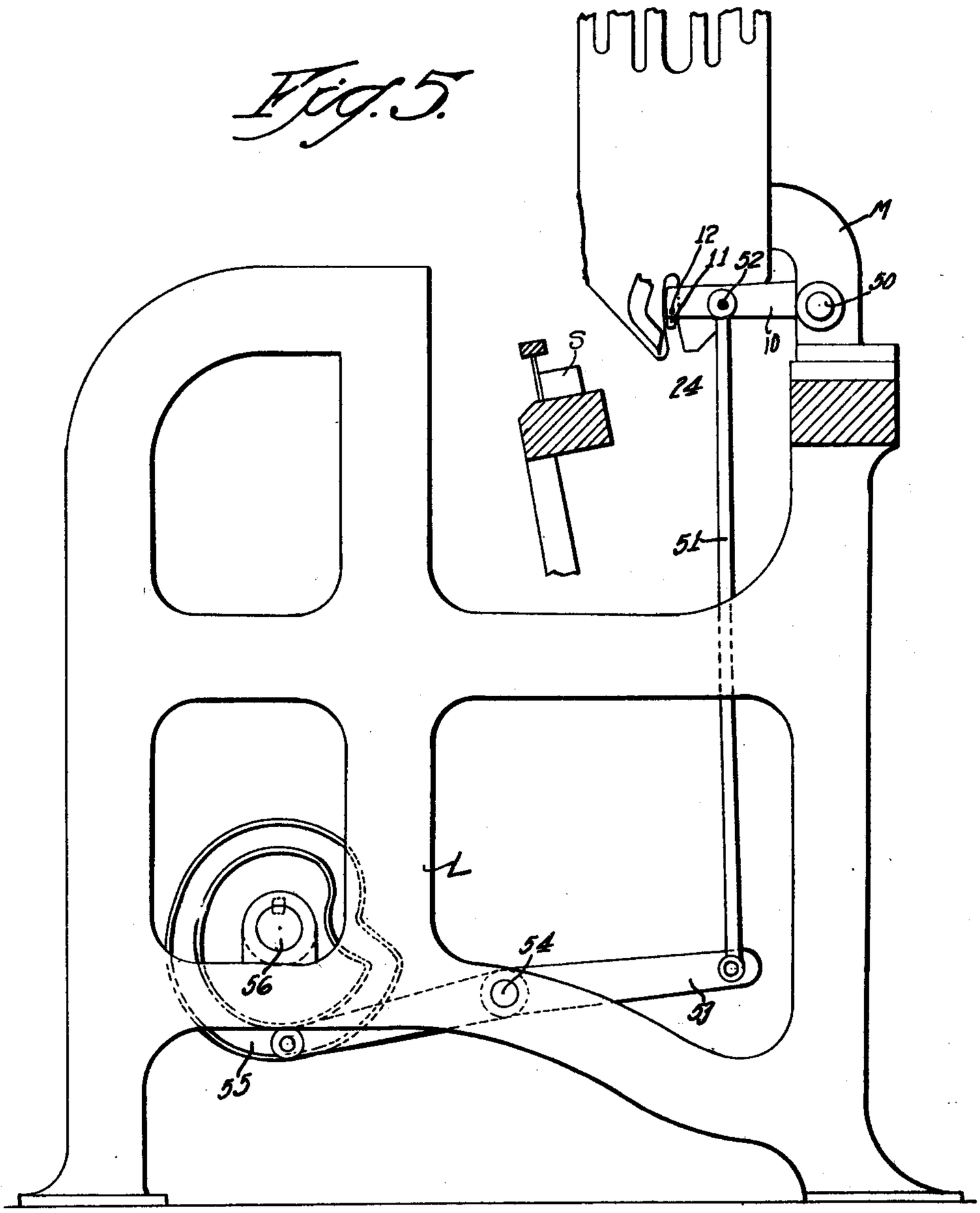
Fig. 5.



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Patented Sept. 4, 1928. 1,683,214

UNITED STATES PATENT OFFICE.

RICHARD G. TURNER, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

WEFT DETECTOR IN REGULARLY-MOVING TRANSFERRER.

Application filed July 3, 1926. Serial No. 120,491.

This invention relates to weft detectors for looms and it is the principal object of the invention to provide a so-called side slip feeler which derives its movement from the inertia of the detector when there is a sudden change in the force which acts to move the detector toward the surface to be detected.

In my co-pending application Ser. No. 120,490 I have shown a weft detector of the caliper type dependent upon the inertia thereof for the tendency to give an indication, said detector being mounted in a regularly movable transferrer of the type set forth in patent to Ryon No. 1,372,316. The transferrer arm is moved on detecting beats of the loom toward the surface to be detected and when arrested in its motion the detector continues toward the yarn because of the energy stored in it. A detector of that type is not capable of detecting down to such fine limits as is possible with the side slip feeler and it is an important object of my invention to apply the principle set forth in the aforesaid application to a detector having a side slipping yarn engaging element.

It is a further object of the invention to mount the yarn engaging element on a lever pivoted on the transferrer arm and held in raised position by a spring which is overcome by the inertia of the moving lever and detector, said spring, however, cooperating with a surface of the lever to cause a deformation of the spring in addition to its expansion for the purpose of giving the detector a quick upward movement immediately after contacting with the yarn to lessen the time of contact of the detector with the yarn.

Because of the varying types of cloth which a loom is called upon to weave it is necessary from time to time to adjust the speed of the same with regard to the number of picks laid per minute. The energy stored in a moving mass depends among other things upon its rate of motion, and it is desirable to have the detector strike the yarn substantially the same blow for all speeds of the loom, but this condition could not prevail unless a change were made with each different speed to lessen or increase the resistance offered to the inertia of the moving parts so that the net effective inertia would be the same for all speeds. It is accordingly a further object of my invention to provide ready means to vary the resistance offered the inertia of the moving parts to the end that the device may operate with uniform pressure on the weft at different rates of speed.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawings wherein I have shown a convenient embodiment of my invention,

Fig. 1 is a rear elevation of a transferrer arm having my improved detector applied thereto and showing the same in contact with a full bobbin,

Fig. 2 is a view similar to Fig. 1 but with the detector moved to indicating position when in contact with a bobbin having an insufficient supply of weft,

Fig. 3 is a top plan view looking in the direction of arrow 3, Fig. 1,

Fig. 4 is an enlarged vertical section on line 4—4 of Fig. 3, and

Fig. 5 is a side elevation showing operating mechanism.

Referring to the drawings it will be seen that I have provided a transferrer arm 10 having an extended portion 11 lying above and parallel to the axis of the shuttle and bobbin. A plunger 12 is slidably mounted in a portion of the transferrer arm and has a shoulder 13 which receives the inner thrust of a compression spring 14 the outer end of which bears against a clip 15 held to the transferrer arm by screw 16. The plunger 12 is provided with a head 17 which engages the clip to limit inward movement of the plunger under the action of spring 13.

A latch 18 is pivoted as at 19 to the transferrer arm and moves in a vertical slot 20 extending through the arm, said latch having a hook 21 which normally engages the head 17 to hold the parts in the position shown in Fig. 1. A spring 22 tends normally to move the latch in a right hand direction around its pivot so that a depending finger 23 of the latch will normally occupy the position shown in Fig. 1.

The detecting unit comprises an element indicated at 24 which is pivoted as at 25 to a lever 26 moving in the slot 20 about a stud 27 extending across said slot and secured to the transferrer arm. A boss 28 on the lever 26 serves to stop a set screw 29 passing through

an extension 30 of the detector to limit right hand motion of the detector about its pivot. A tension spring 31 is connected to the extension 30 and has the straightened part thereof passed through an ear 32 and held therein in adjusted position by a set screw 33. The matter thus far described is substantially the same as that set forth in several co-pending applications, such for instance, as Ser. No. 78,181.

As heretofore constructed the lever 26 has been extended to the right of its pivot to engage a yielding stop carried by a fixed part of the loom such as the magazine frame and the regular downward motion of the transferrer arm has brought such extended end of the lever periodically into engagement with the stop so that continued downward motion of the transferrer arm resulted in moving the detector toward the yarn. With such a construction it has been found that the detector is in contact with the weft during the time that the lay completes its forward motion and the result of this is to produce wearing of the yarn under the detector to an objectionable degree. It is an important feature of my present invention to overcome this wearing and the comparatively long time during which the detector is in contact with the yarn by depending upon the inertia of the downwardly moving detector unit composed as shown herein of element 24 and lever 26 to give the detecting movement, such movement not starting until the transferrer has reached its extreme downward position which usually coincides with the extreme forward position of the lay, so that the detector engages the yarn when the latter is practically at rest and the objectionable relative motion of the yarn forwardly under the detector is avoided. By unit I mean that portion of the structure supported by the transferrer arm which is movable by its inertia toward the bobbin when the transferrer arm comes to rest.

In carrying out my invention I provide a tension spring 40 one end of which is caught under a screw 41 secured in the lever 26 preferably above the stud 27 and the other end of said spring is received by a screw 42 threaded in a lug 43 preferably cast integral with the transferrer arm, said screw being retained in adjusted position by a lock nut 44. The screw 42 permits adjustment of the tension of the spring 40 and hence affords means to vary the resistance offered the inertia of the moving parts.

In order to provide for the quick upward return movement of the detectors I form lever 26 with a short extension 45 having an upwardly curved surface 46 along which a portion of the spring 40 extends, said extension engaging a portion of the transferrer arm to limit upward movement of the lever 26 under action of the spring 40.

As previously stated this detector is of the type shown in my co-pending application Ser. No. 120,490 and in patent to Ryon No. 1,372,316 wherein the transferrer arm is given regular movements to present the detector to the surface to be detected on alternate beats of the loom when the active shuttle is under the magazine. The mechanism for effecting this movement is shown in Fig. 5 wherein the magazine M has a transferrer arm 10 pivoted thereto as at 50 and operatively connected to an upright rod 51 as at 52. The lower end of said rod is connected to a cam lever 53 pivoted as at 54 to the loom frame L. The rear end of the lever is operatively connected to the cam 55 which may be substantially the same as shown in Figs. 1 and 13 of the Ryon patent. Said cam is secured to the bottom shaft 56 and completes its revolution in two picks of the loom.

In the normal operation of the loom the transferrer arm is given a quick downward motion every detecting beat of the loom by cam 55, the transferrer arm being arrested in its downward motion as it approaches the bobbin. During this downward motion the lever 26 is held in raised position by the spring 40 and the comparatively light spring 31 holds the stop screw 29 against the lug 28. As the transferrer arm is brought to a sudden stop at the bottom of its stroke the lever 26 because of its inertia continues to move downwardly, being resisted in this motion by spring 40. When the detector engages the surface to be detected it will be to one side of a vertical line passing through the pivot 25. If at this time sufficient yarn is present for continued weaving the teeth of the detector will be embedded in the yarn and side slipping movement along the bobbin will be resisted and there will be little if any relative angular motion of the detector and the supporting lever 26. If, on the other hand, there is insufficient yarn present to resist sliding movement of the detector as the latter reaches the downward limit of its motion it will slide along the bare bobbin until it engages the depending finger 23, further movement of the detector after contact with said finger serving to give the latch 18 a counter-clockwise movement against the action of spring 22 sufficient to lift the hook 21 from locking engagement with the head 17. Spring 14 will immediately move the plunger 12 from the position indicated in Fig. 1 to that shown in Fig. 2, a condition which as set forth in the aforesaid patent corresponds to an indication of weft exhaustion and a setting of the loom for a change in its operation.

As shown in Figs. 2 and 4 when the detector is in indicating position the left hand

end of the spring 40 will be bent in the form of a slight curve by contact with the surface 46 and this deformation of the spring in addition to the expansion thereof as brought about by the downward motion of the detector and lever 26 places said spring under an additional strain, the effect of which is to raise the lever and detector very quickly after the inertia of the parts has been spent. I find in actual practice that a detector made as set forth herein will leave less waste on the bobbin than is the case with previously known detectors mounted on transferrer arms.

From the foregoing it will be seen that I have provided a weft detector of the side slip type mounted in the transferrer arm of the loom and that I depend upon the inertia of a freely movable part to supply the force necessary to give the detector its indicating movement. Furthermore, it will be seen that the lever 26 will be given a quick upward movement due to the deformation of the axis of the spring 40 when the same is wrapped around the surface 46. Also, when a change in the rate of running of the loom and hence the rate at which the transferrer arm descends has been made a corresponding adjustment can be made in the tension of the spring 40 by the screw 42.

Having thus described my invention, it will be apparent that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention, and I do not wish to be limited to the details herein disclosed but what I claim is:

1. In a weft detector for looms having a surface to be detected, a side slipping weft detector movable along the surface to be detected to give an indication of weft exhaustion, a carrier for the detector with regard to which the latter is movable angularly, a supporting structure on which the carrier is mounted and with respect to which the same is movable, means to move the supporting structure toward the surface to be detected and to arrest movement thereof toward the surface, and resilient means to hold the carrier in normal position away from the surface, the carrier and detector being moved toward the surface by the structure and overcoming the resilient means solely by the inertia force of said carrier and detector and tending to have an indicating movement when the motion of the structure is arrested.

2. In a weft detector for looms having a surface to be detected, a side slipping weft detector movable along the surface to be detected to give an indication of weft exhaustion, a transferrer arm, means to move the transferrer arm toward the surface to be detected and to arrest movement thereof as the same approaches the surface, a carrier for the detector movably mounted on the transferrer arm, the carrier being normally held away from the surface to be detected and being moved toward the surface with the transferrer arm, the detector upon the arresting of movement of the transferrer arm toward the surface being acted upon solely by the inertia of said detector to move toward the surface and tending to have an indicating movement.

3. In a weft detector for looms having a surface to be detected, a side slipping weft detector movable along the surface to be detected to give an indication of weft exhaustion, a transferrer arm, means to move the transferrer arm toward the surface to be detected and to arrest such motion as the arm approaches the surface, a lever pivoted thereto, and a pivotal connection between the detector and the lever, said lever and detector being normally held away from the surface to be detected and being movable toward said surface by the transferrer arm, the lever and detector tending solely by the inertia force thereof to move toward the surface as the transferrer arm ceases its motion toward the surface.

4. In a weft detector for looms having a surface to be detected, a side slipping weft detector movable along the surface to be detected to give an indication of weft exhaustion, a transferrer arm movable toward the surface to be detected and arrested in such motion as the same approaches the surface, a lever pivoted to the transferrer arm, a pivotal connection between the lever and the detector, a spring connected to the lever and the transferrer arm and tending normally to hold the lever and arm away from the surface, said detector and lever moving toward the surface with the transferrer arm and acting solely by reason of the inertia thereof against the spring to move toward the surface to be detected and tending to have an indicating movement when motion of the transferrer arm toward the surface is arrested.

5. In a weft detector for looms having a surface to be detected, a side slipping weft detector movable along the surface to be detected to give an indication of weft exhaustion, a transferrer arm movable toward the surface to be detected and arrested in such motion as the same approaches the surface, a lever pivoted to the transferrer arm, the greater part of the weight of the lever lying to one side of the pivotal connection between the lever and the transferrer arm, a pivotal connection between the lever and the detector, a spring connected to the lever and the transferrer arm and tending normally to hold the lever and arm away from the surface, said detector and lever moving toward the surface with the transferrer arm and acting solely by reason of the inertia thereof against the spring to move toward

the surface to be detected and tending to have an indicating movement when motion of the transferrer arm toward the surface is arrested, and means to vary the resistance offered by the spring to the movement of the lever and detector.

6. In a weft detector for looms having a surface to be detected, a side slipping weft detector movable along the surface to be detected to give an indication of weft exhaustion, a transferrer arm movable toward the surface to be detected and arrested in such motion as the same approaches the surface, a lever pivoted to the transferrer arm, the greater part of the weight of the lever lying to one side of the pivotal connection between the lever and the transferrer arm, a pivotal connection between the lever and the detector, a spring connected to the lever and the transferrer arm and tending normally to hold the lever and arm away from the surface, said detector and lever moving toward the surface with the transferrer arm and tending by reason of the inertia thereof acting against the spring to move toward the surface to be detected and tending to have an indicating movement when motion of the transferrer arm toward the surface is arrested, said spring being deformed in one direction to resist the inertia of the lever and detector, and means carried by the lever to give said spring an additional deformation whereby said spring will be additionally effective to restore the lever and detector to normal position after the inertia of said parts has been spent.

7. In a weft detector for looms having a surface to be detected, a side slipping detector unit, a support for the unit movable toward the surface to be detected, said unit having a portion movable along and in contact with the surface at exhaustion of weft, means to move the support toward the surface to be detected and to cause a sudden arresting of such motion, the detecting unit being movable relatively to the support toward the surface to be detected solely by the inertia energy stored in said unit due to the motion of the support, the inertia energy moving the unit to cause indication of weft exhaustion when the weft is depleted.

8. In a weft detector for looms having a surface to be detected, a detector element of the side slipping type movable along and in contact with the surface at substantial weft depletion to indicate weft exhaustion, a carrier for said element with respect to which the element is movable, a transferrer arm on which the carrier is movably mounted, and means to cause movement of the transferrer arm toward the surface and to arrest such motion abruptly, the inertia energy stored in the element and lever due to the movement of the transferrer arm acting to move the detector toward the surface and along the latter at substantial exhaustion of weft, the inertia energy being the only force acting on said detector tending to move the same toward and along the surface to be detected.

9. In a weft detector for looms having a surface to be detected, a detector unit of the side slipping type having a portion movable along and in contact with the surface to be detected at substantial exhaustion of weft, a support for the unit movable toward the surface to be detected, the said surface moving toward and from the support and being momentarily at rest when in its nearest position to the support, and means to move the support toward the surface and to bring said support to rest abruptly when the surface is momentarily at rest, the inertia energy of the unit acting to move the same toward the surface to be detected when the surface and support come to rest, the movement of the unit being caused solely by the inertia force of the unit.

10. In a weft detector for looms having a surface to be detected, a side slipping weft detecting element, a carrier for the detecting element, a support for the carrier, said element movable along and in contact with the surface being detected to indicate substantial exhaustion of weft, means to move the support toward the surface to be detected and to cause a sudden arresting of such motion, resilient means to hold said carrier in raised position relatively to the support, the carrier to be moved toward the surface to be detected by the inertia thereof upon sudden arresting of the support, a second resilient means to hold the element normally in raised position with respect to the support, said second resilient means tending to cause the detecting element to assume its normal position after indication of weft exhaustion.

In testimony whereof I have hereunto affixed my signature.

RICHARD G. TURNER.