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3,298,401	1/1967	Stutz	139/371
3,322,162	5/1967	Rydborn.....	139/371
3,467,149	9/1969	Dosch et al.	139/371
3,485,964	12/1969	Stutz et al.	139/371 X

FOREIGN PATENTS

1,473,899	2/1967	France	139/371
918,529	2/1963	Great Britain.....	139/371
455,672	7/1968	Switzerland	139/336
1,253,647	11/1967	Germany	139/371

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[54] **WEFT YARN CONTROL APPARATUS**
7 Claims, 4 Drawing Figs.

[52] U.S. Cl..... **139/371**
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[56] **References Cited**
UNITED STATES PATENTS
2,535,369 12/1950 Pelce..... 139/371

ABSTRACT: Weft yarn control apparatus for use in a weaving loom and having a signal generator arranged in a shuttle to generate a signal of a given resonance during normal running of the yarn, and to generate a signal of a second resonance upon yarn breakage, the signals being transferred to a receiver inductively coupled with the generator and which, upon receipt of a breakage signal, produces an impulse effective to immobilize the loom.

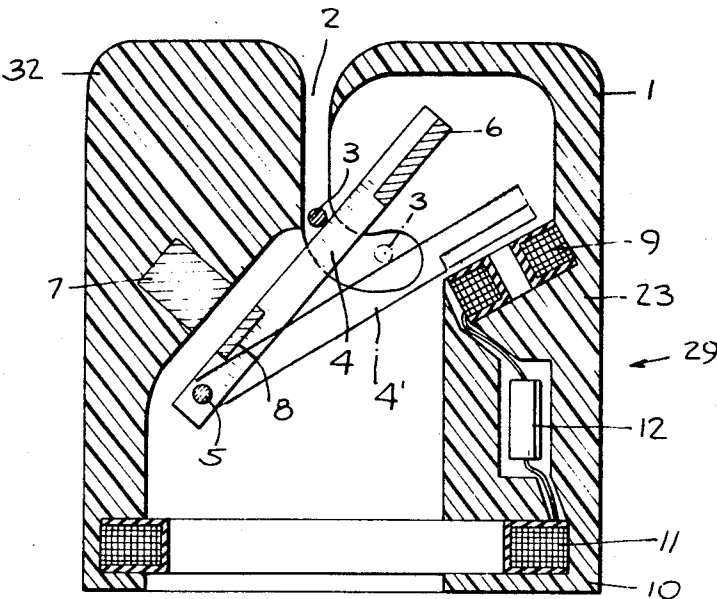


Fig. 1.

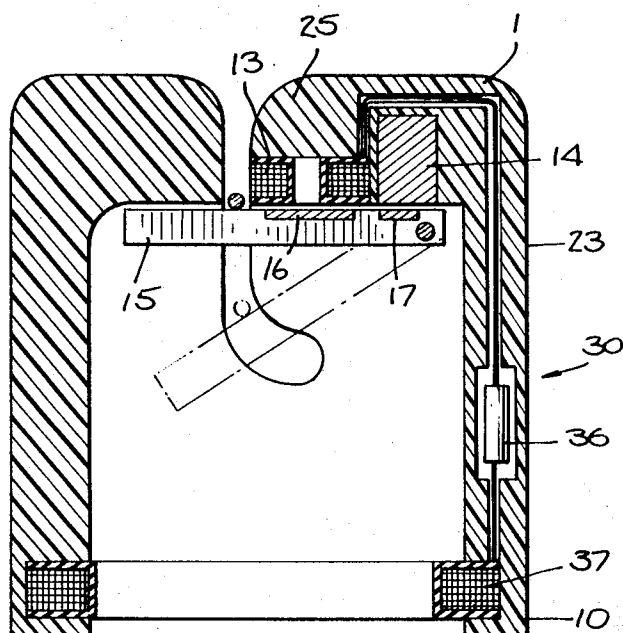
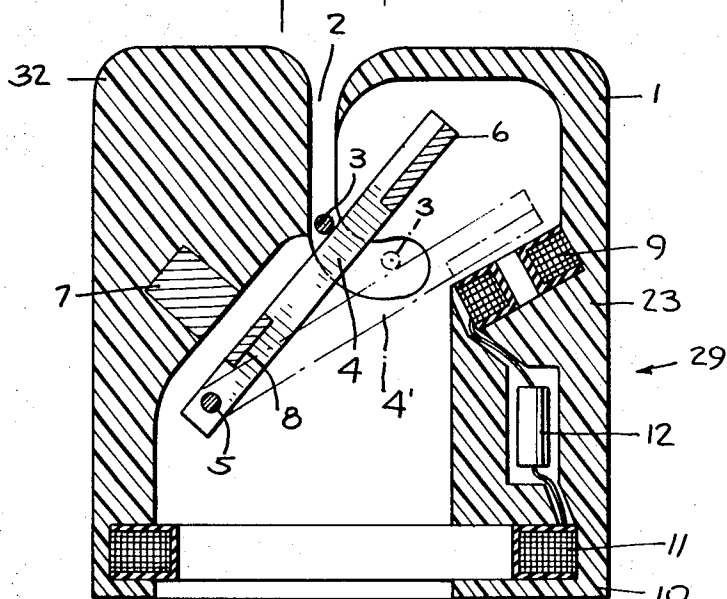


Fig. 2.

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Fig. 3.

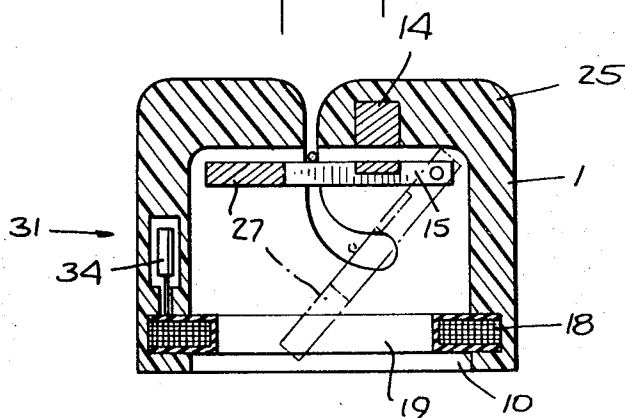
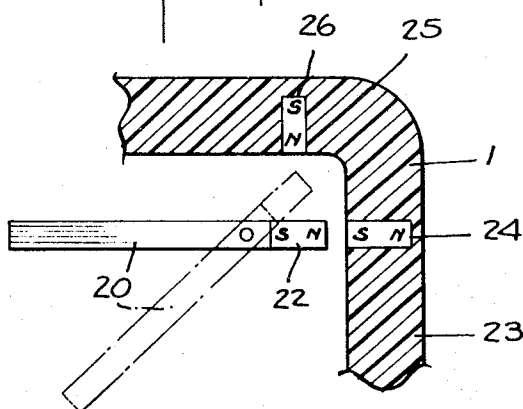


Fig. 4.



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WEFT YARN CONTROL APPARATUS

This invention relates to apparatus for the control of weft yarns, and more particularly for monitoring the entry of weft yarn in weaving looms and to effect immediate immobilization of the loom upon breakage of the weft yarn.

Heretofore, a number of devices have been applied to weaving looms or to shuttles therefor for the purpose of shutting down the loom upon breakage of the weft yarn. However, to applicants' knowledge, no such devices have been entirely satisfactory, usually because of their complexity or because their response time has not been sufficiently rapid to shut down the loom prior to the laying-in of one or more picks after the yarn breakage occurs.

We have conceived by our invention a control apparatus of the class described by which we are able to overcome the foregoing difficulties and disadvantages. Thus, we contribute apparatus according to which a signal generator arranged in the shuttle is adapted to transfer a signal to a receiver fixed on the weaving lay and indicating according to its resonance frequency whether the yarn is running normally or whether a breakage has occurred or the yarn end has been drawn off the weft coil. Only relatively few parts are needed in our apparatus, and these are readily able to withstand the rough treatment normally received by a shuttle. Additionally, a breakage signal can be used immediately to shut down the loom.

According to the present inventive concept, we contribute weft yarn control apparatus for a weaving loom, comprising: a signal generator mounted in a shuttle and adapted to transmit a signal of a given resonance during proper running of the weft yarn, and a signal of a second reference upon relaxation of the yarn due to breakage or the like, and a receiver inductively coupled with the signal generator which, upon receipt of the second signal produces a control impulse which immobilizes the loom.

As a feature of our invention, the generator may include an oscillating circuit having a tuning coil and an armature mounted for movement relatively to the coil responsive to tension in the weft yarn; and means are cooperatively arranged in respect of the armature to shift same upon relaxation of the yarn tension. A condenser may be connected in parallel with the tuning coil and with a coupling coil to obtain a variation in resonance frequency of the oscillation circuit upon movement of the armature relatively to the tuning coil.

The armature may be formed of a ferromagnetic material and may be carried by a lever pivotally mounted to move the armature towards the tuning coil when the yarn is brought under normal running tension and away from the tuning coil when the tension is relaxed. Actually, we prefer to use magnet means for exerting a force upon the lever to urge the same, and the armature mounted thereon, away from the tuning coil; and in this connection, a pair of suitably oriented magnets may be used, one mounted on the lever itself, and the other conveniently mounted nearby.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent construction as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a vertical sectional view illustrating an illustrative embodiment of our invention, and showing the armature

under a no-tension position in solid lines, and in active position in broken lines;

FIG. 2 is a view similar to that of FIG. 1 but illustrating a modification thereof;

FIG. 3 is also a vertical sectional view of apparatus according to the present invention, but illustrating still a further modification thereof; and

FIG. 4 is a cross-sectional view illustrating an arrangement of magnets for exerting a retractive force in respect of the armature.

Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a housing 1 which may be positioned in the throat of a shuttle near the yarn supply, and which is formed with a yarn lead-in groove 2 for receiving a weft yarn 3. A lever 4 is mounted at 5 for pivotal movement within the housing 1 and is shown in its inactive position in solid lines and in its active position in broken lines, as indicated at 4'. It will be noted that the length of the lever 4 passes across the lead-in groove 2.

A magnet 8 is mounted in the lever 4 opposite a cooperating magnet 7 fixed in the wall of the housing 1, these magnets combining to exert a force on the lever 4 tending to pivot the same to the position indicated in solid lines; and when the tension in the yarn 3 is sufficiently relaxed, the lever 4 will assume that position. However, when the loom is operating and the tension in the yarn 3 is normal for operating conditions, the yarn will force the lever 4 downwardly into the position indicated at 4', in which position, a ferromagnetic armature 6 fixed at the end of the lever 4 is brought into proximity to an inductive tuning coil 9 conveniently positioned in the wall 23 of the housing 1.

The magnetic armature 6 may also consist of electrically conductive material preferably a nonferrous metallic material such as aluminum whereby to influence the resistance loss in the tuning coil 9.

The tuning coil 9, together with a coupling coil 11 arranged at the bottom 10 of the housing 1, and a condenser 12 connected in parallel with the two coils, forms a resonance circuit 29.

From the description thus far, it will be appreciated that movement of the lever 4 about its pivot point 5 will shift the armature 6 towards or away from the tuning coil 9, dependent upon the tension in the yarn 3, thus to vary the resonance in the oscillation circuit; and that at a certain frequency, a control impulse may be transmitted for the purpose of immobilizing the loom.

Turning now to the modification of FIG. 2, the tuning coil 13 and retraction magnet 14 are arranged in the upper part of the housing 1 and above the lever 15 which, in this case, pivots about a point conveniently located at its right hand side, as viewed. In the inactive position, armature 16 mounted on the lever 15 is brought toward the tuning coil 13; while in active position, it is moved away from the coil 13. Thus, the resonance frequency of the oscillation circuit 30 which includes the tuning coil 13, the condenser 36 and the coupling coil 37 positioned at the bottom of the housing 1, is varied. Again, the lever 15 is urged towards its active position by the tension in the yarn 3, and when that tension is relaxed, is brought into its inactive position by the action of the magnets 14 and 17, the latter being mounted in the lever 15.

A further modification of the invention is illustrated in FIG. 3, according to which the magnet 14, the lever 15, and the magnet 28 mounted in the lever are arranged generally along the lines of the embodiment of FIG. 2. The inductance of the resonant circuit 31, consisting of the condenser 34 and coil 18 is, however, influenced by the position of the lever 15 which, when pivoted downwardly as viewed, brings the ferromagnetic armature 27 into the inner field 19 of the coil 18. It will be appreciated, therefore, that movement of the lever 15 relatively to the coil 18 will vary the resonance in the latter coil. In this case, the coil 18 is wound so as to serve as a tuning coil as well as a coupling coil.

FIG. 4 illustrates a multimagnet system acting as the retraction force for the lever 20. In this embodiment, a magnet 22 is positioned at one end of the lever while a second magnet 24 is mounted in the sidewall 23 of the housing 1, and a further magnet 26 is mounted in the upper wall 25 of the housing. The magnets 22 and 24 are so oriented that their opposite poles are adjacent one another when the lever is in the position illustrated in solid lines, thus to effect an attractive force. This movement is enhanced by the magnet 26 which is so oriented in respect of the magnet 22 as to repel the lever 20 towards the position illustrated in solid lines, thereby creating a somewhat larger force of retraction to bring the lever into the inactive position than that force which is effected by the magnets 22 and 24 alone.

Again, it will be appreciated that the impulse created by movement of the armature mounted in the lever to the inactive position can be applied by known means to effect immediate immobilization of the weaving loom so that the same is brought to a stop as soon as a defect signal is received.

We believe that the construction and operation of our novel weft yarn control apparatus will now be understood, and the advantages of our invention will be fully appreciated by those persons skilled in the art.

We claim:

1. Apparatus for producing a detectable electrical signal which may be used in immobilizing a loom upon breakage of the weft yarn which comprises:
 - a weft yarn shuttle;
 - a resonant electrical circuit mounted in said shuttle, said circuit including a tuning element;
 - an armature mounted in said shuttle for movement relative to said tuning element for influencing its tuning effect on

said resonant circuit whereby the position of said armature relative to said tuning element changes the resonant frequency of said circuit; and

means for guiding a weft yarn in said shuttle across the path of armature movement to hold said armature in different positions relative to said tuning element according to the tension in said weft yarn.

2. Apparatus according to claim 1 wherein said tuning element is a tuning coil and said resonant electrical circuit further includes condenser means connected with said tuning coil and a coupling coil to obtain a variation in resonance frequently of said circuit upon movement of said armature relatively to said tuning coil.

3. Apparatus according to claim 1, wherein said armature is carried by a lever pivotably mounted to move said armature towards said tuning element when said yarn is brought under normal running tension and away from said element when said tension is relaxed.

4. Apparatus according to claim 3, wherein said armature consists of electrically conductive material.

5. Apparatus according to claim 3 wherein said armature is a ferromagnetic material.

6. Apparatus according to claim 3 further including magnet means to shift said lever relatively to said tuning element upon relaxation of tension in the yarn.

7. Apparatus according to claim 6, wherein said magnet means comprise a first magnet mounted on said lever and a second magnet cooperatively oriented relatively to said first magnet to exert a force on said lever to urge said armature away from said tuning coil.

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