July 25, 1944. W. Y. ROBB 2,354,615

DETECTOR FOR AXMINSTER SELVAGE SHUTTLES

Filed Dec. 14, 1942

FIG. 1

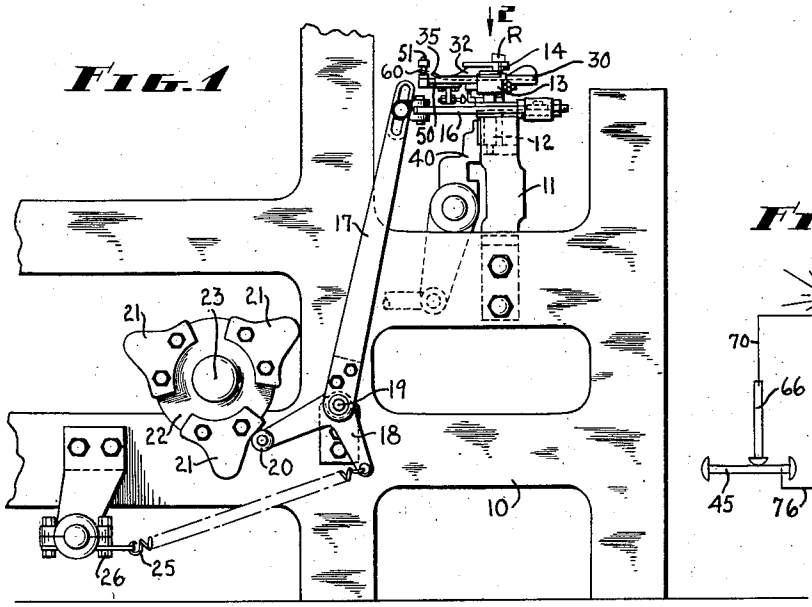


FIG. 5

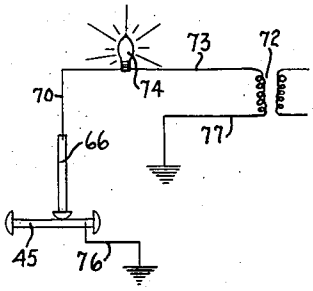


FIG. 2

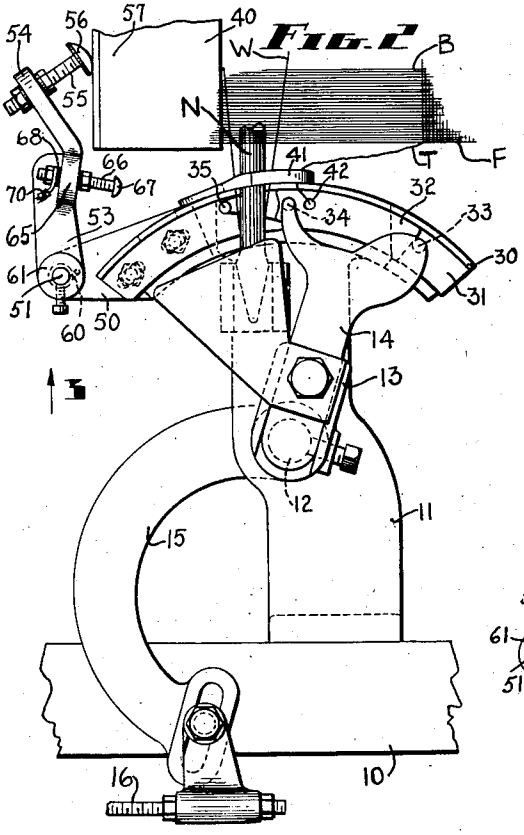


FIG. 3

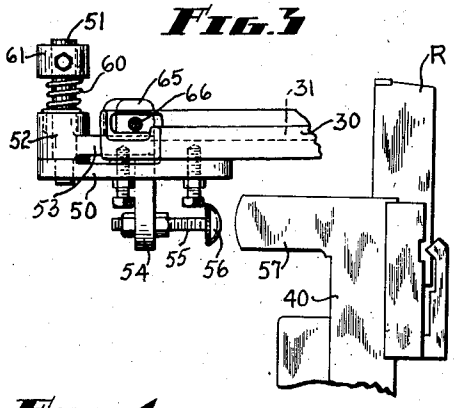
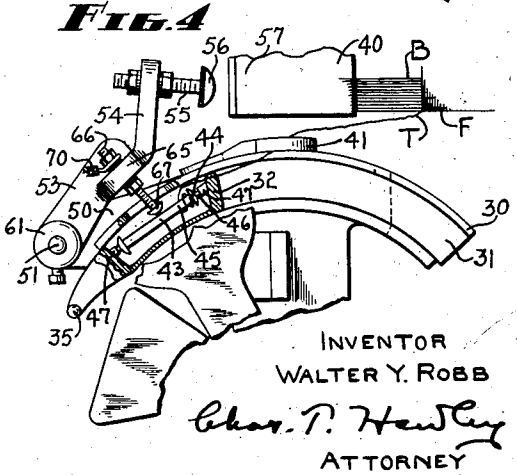


FIG. 4



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DETECTOR FOR AXMINSTER SELVAGE SHUTTLES

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This invention relates to improvements in Axminster looms and it is the general object of the invention to provide a selvage thread detector to determine when the selvage thread in the selvage shuttle is depleted.

Axminster looms operate with a needle which moves into and out of the warp shed to lay a looped or double pick of weft drawn from a stationary supply. When the needle is fully inserted into the shed a selvage shuttle is projected through the weft loop to hold it during retraction of the needle. As the cloth is woven the yarn in the shuttle is consumed but so far as I am aware no attempt has been made heretofore to determine automatically when the yarn supply in the shuttle should be renewed. The usual procedure requires that the weaver inspect the supply from time to time and renew it before exhaustion.

It is an important object of my present invention to provide a selvage thread detector which will enter the selvage shuttle and contact the selvage yarn at regular intervals and act upon exhaustion of the yarn to give a signal or cause some change which will attract the attention of the weaver. In this way the weaver is relieved of the necessity of constantly watching the yarn in the shuttle with the result that he can attend to more looms.

The shuttle operating mechanism includes a grooved segment in which the shuttle moves along an arcuate path, being normally stationary at one end of its path and projected through the weft loop and then returned to its starting position. The relation between the lay and the weft needle in an Axminster loom is such that the lay dwells in rear position during insertion of weft and selvage shuttle movement, but after the weft needle has been retracted and the selvage shuttle has returned to its normal position the lay advances to beat up the double pick of weft. It is another object of my invention to control the selvage thread detector by the lay or some part moving with it to effect detection of thread in the selvage shuttle during the period of its inaction while the lay is in motion.

The selvage shuttle is customarily provided with a bobbin or spool rotatably mounted in the shuttle and turning as the yarn unwinds. This bobbin or spool is generally made of metal and it is a further object of my invention to provide an electric selvage thread detector having an insulated contact or feeler arm which is presented regularly to the bobbin. So long as sufficient yarn is present the contact finger will be held away from the bobbin, but when the latter is depleted the uncovered spindle or barrel of the bobbin will be engaged by the feeler arm to close an electric circuit. This circuit can be used to effect any desired change in the loom, such as actuation of a signal or the like which will indicate to the weaver that the selvage shuttle is empty.

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 accompanying drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is an end elevation showing part of an Axminster loom having my invention applied thereto,

Fig. 2 is an enlarged plan view looking in the direction of arrow 2, Fig. 1, showing the selvage shuttle passing through a weft loop with the weft needle in the warp shed,

Fig. 3 is an end elevation on an enlarged scale looking in the direction of arrow 3, Fig. 2.

Fig. 4 is a view similar to a portion of Fig. 2, but showing the shuttle in section and in the position it normally occupies during its inactivity with the detector engaging a depleted bobbin, and

Fig. 5 is a diagrammatic view setting forth a type of circuit which can be closed by the detector for the purpose of indicating depletion of selvage thread in the selvage shuttle.

Referring to the drawing, a loom frame 10 has mounted thereon an upright stand 11 in which is mounted a vertical stub shaft 12. This shaft has secured to the upper end thereof a crank 13 which receives a shuttle actuating arm 14 extending toward the center of the loom. The lower end of the shaft has secured thereto an operating arm 15 connected to a rod or link 16 extending rearwardly and connected to an arm 17. The latter is part of a lever 18 pivoted at 19 on a fixed axis. A roll 20 carried by the lever 18 is positioned for engagement with the cam tappets 21 mounted on a spider or web 22 secured to the loom shaft 23. A spring 25 connected at its forward end to the lever 18 and at its rear end to a fixed support such as 26 acts to hold the roll 20 against the tappets and tends normally to move the arm 17 to the right as viewed in Fig. 1.

A segment 30 is secured to the bracket 11 and is provided with an upwardly facing groove 31 serving as a race to receive a selvage shuttle 32. The shuttle is driven back and forth along the arcuate groove 31 in the customary manner by

pins 33 and 34 on the operating arm 14. The shuttle has a horn or point 35 projecting rearwardly therefrom as viewed in Fig. 2 to pass through the loop of weft W laid by the weft needle N of the loom.

The lay 40 may be of any convenient form and is provided with a reed R through which the binder warp threads B pass from a beam at the rear of the loom not shown forwardly to the fell of the fabric F. The selvage thread T extends from the adjacent selvage of the fabric through a guide 41 secured to the segment 30 and passes into an eye 42 in the top wall of the shuttle.

The thread T is wound on a bobbin or spool 43 preferably metallic and having heads 44 secured to the spool barrel 45. Guide points 46 on the ends of the spool enter bearings 47 carried by the shuttle. The spool rotates with respect to the shuttle in its bearings as the thread is unwound due to successive passages of the shuttle through the weft loops laid by the needle N. The spool and the parts of the shuttle which it contacts are metallic as is also the segment 30 and the spool is therefore grounded to the loom frame.

In the operation of the mechanism thus far described the needle N enters the warp shed from that side opposite the selvage shuttle to lay a weft loop when the lay 40 is in rear position. Before the needle reaches the position shown in Fig. 2 one or another of the tappets will move the shuttle forwardly to a position in front of the needle. When the needle is fully inserted into the shed the active tappet permits spring 25 to return the shuttle rearwardly through the weft loop and to its normal position. The needle N is then retracted and after it is entirely out of the warp shed the lay 40 moves forwardly to beat the double pick of weft into the fabric F, after which the lay returns to its back position preparatory to the next insertion of the needle. The matter thus far described is of common construction in Axminster looms and may be made and operated in the usual manner. The weaving of the fabric F consumes the thread T and eventually the spool 43 will become empty.

In carrying my present invention into effect I provide means for determining when the thread T in the selvage shuttle is exhausted. In the form of the invention shown in the drawings I extend a stand 50 rearwardly from the segment and secure thereto a vertical stud 51 which passes through the hub 52 of a detector lever 53. This lever has an inwardly extending finger 54 in which is adjustably mounted a transverse bolt or the like 55 having a head 56 for engagement with a part 57 secured to and moving with the lay 40. A torsion spring 60 surrounds the stud 51 and has the lower end thereof attached to the hub 52 and the upper end held in a collar 61 angularly adjustable on the fixed stud 51. The collar affords means for varying the force exerted by the spring 60 on the arm 53 tending to move the latter forwardly or to the right as viewed in Fig. 2.

Lever 53 is provided with an upright arm 65 which carries an electric contact detector finger 66 insulated therefrom. As shown in Fig. 2 this contact element is in the form of a screw having a head 67 and a shank passing through insulated bushings 68 on the arm 65. The finger 66 can be adjusted transversely of the lever 53 and an electric wire 70 is permanently connected to the detector element but insulated from the lever 53.

In Fig. 5 I show a form of electric circuit which can be utilized to signal the weaver when weft is exhausted. This circuit includes a source of electric power 72 connected by wire 73 to a lamp 74 which in turn is connected to the wire 70. The spool barrel 45 is grounded as already described and this ground is indicated in Fig. 5 by wire 76. That side of the source of power 72 opposite wire 73 is grounded by wire 77.

In the operation of my invention the shuttle will normally be in the rear position, or at the left end of the groove 31 as shown in Fig. 4 when the lay is in its forward position beating up a previously laid weft. When the lay is in this position the spring 60 rocks a lever 53 clockwise as viewed in Fig. 4 to project the head 67 of the detector finger 66 against the spool in the shuttle. So long as sufficient thread is present it will insulate the detector finger from the grounded spool and the circuit indicated in Fig. 5 will remain open. If, however, the thread is exhausted, the detector finger 66 will engage the barrel 45 of the spool and the circuit will be closed to cause illumination of the lamp 74, thus indicating to the weaver that the selvage shuttle needs replenishment.

When the lay moves rearwardly preparatory to the insertion of needle N part 57 will engage finger 56 and rock lever 53 to the position shown in Fig. 2 to move the head 67 out of the shuttle. The detector is therefore temporarily held away from the shuttle by the lay during that part of the loom cycle in which the weft needle is in the shed and the shuttle has its oscillation for catching the looped weft. The detector is thus presented at regular intervals to the spool and shuttle under control of the lay part 57. The lay always advances at a time when the shuttle is momentarily in rear position and the detecting operation therefore occurs when the shuttle is stationary. The circuit shown in Fig. 5 will be closed each time the lay moves forwardly if the thread is exhausted and the lamp 74 will periodically flash on and off to attract the weaver's attention when the spool is empty.

From the foregoing it will be seen that I have provided a simple form of selvage thread detector to cooperate with the selvage shuttle of an Axminster loom and give indication to the weaver when the shuttle is exhausted of thread. It will also be seen that the detector finger 66 is controlled by the lay or some part moving in timed relation therewith and is presented to the spool when the latter is temporarily at rest and is removed from the spool before the time in the loom cycle arrives for the next weft looping movement of the shuttle. Since the spool rotates during loom operation it presents different fresh surfaces to the detector finger. While I have shown a particular kind of circuit including a signal lamp I do not wish to be limited to this particular means of utilizing the indication of exhaustion of the selvage shuttle.

Having thus described my invention it will be seen 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 an Axminster loom having a reciprocating lay and a weft inserting needle which is inserted into the warp shed when the lay is in rear position, a selvage shuttle which has a movement through the weft loop laid by the needle when the latter is inserted into the shed and

thereafter returns to a normal stationary position, a detector for the selvage thread in the shuttle, means to present the detector to the shuttle when the latter is in normal stationary position, and signal means brought into action when the weft detector indicates exhaustion of weft in the selvage shuttle.

2. In an Axminster loom having a selvage thread carring shuttle and a lay to beat up weft laid by a weft needle and held by the selvage thread, a selvage thread detector for the thread in the shuttle controlled by the lay, and means cooperating with the lay to move the detector into detecting position with respect to the thread in the shuttle when the lay moves forwardly.

3. In an Axminster loom having a selvage shuttle provided with a selvage thread extending to the fabric being woven, the loom having a lay to beat up weft laid by a weft needle and held by the selvage thread, means to maintain the shuttle substantially stationary during the beat-up operation of the lay, a selvage thread detector controlled by the lay, and means cooperating with the lay effective to cause the detector to detect the condition of the thread in the shuttle during the beat-up operation of the lay while the shuttle is stationary.

4. In an Axminster loom having a selvage shuttle movable along an arcuate path and having a supply of thread connected to the fabric being woven, a lay having a beat-up movement, driving mechanism for the shuttle to maintain the latter stationary during the beat-up operation of the lay, and means controlled by the lay and operative during the beat-up operation of the latter to detect the condition of the thread in the selvage shuttle.

5. In an Axminster loom having a selvage shuttle provided with a selvage thread connected to the fabric being woven, the loom having a needle to provide a loop of weft and a lay to beat up the loop of weft, driving mechanism for the shuttle to move the latter through the loop of weft and thereafter maintain the shuttle in a substantially stationary position to hold the loop of weft during the beat-up operation of the lay, and a selvage thread detector for the selvage shuttle controlled by the lay and effective to detect the condition of thread in the selvage shuttle during the beat-up operation of the lay while the shuttle is substantially stationary.

6. In an Axminster loom having a lay to beat up weft and a selvage shuttle having a thread to hold the weft during beat-up, the shuttle having a period of inactivity during the beat-up operation of the reed, a selvage thread detector for the selvage shuttle, means tending normally to move the detector toward the selvage shuttle, and a controller for the detector moving with the lay to effect a detecting operation of the detector during the period of inactivity of the shuttle.

7. In an Axminster loom having a selvage shuttle provided with a selvage thread connected to the fabric being woven, a driving arm for the shuttle, means to operate the driving arm to give the shuttle alternating periods of activity and inactivity, a member having a movement during a period of inactivity of said driving arm, and a selvage thread detector controlled by said member and caused thereby to have a detecting operation with respect to the shuttle during said periods of inactivity of the shuttle when said member has said movement.

8. In an Axmister loom having a fixed selvage shuttle race and a selvage shuttle normally at rest at one end of the race and moving to the other end of the race and returning to normal position to pass through a weft loop laid by a weft needle, a selvage thread detector supported by and pivotally mounted with respect to the shuttle race, and means to cause the detector to have a detecting relation with respect to the selvage thread in the shuttle when the latter is at rest.

9. In an Axminster loom having a stationary selvage shuttle race and a selvage shuttle normally at rest at one end of said race and moving along the latter and returning to said one end to pass through a loop of weft laid by a weft needle, the loom having a lay to beat up the weft laid by the weft needle while the selvage shuttle is at rest, a selvage thread detector movably mounted with respect to the shuttle race, and means cooperating with the lay to cause the detector to move into detecting relation with respect to the shuttle when the latter is at rest and move said detector out of detecting relation with respect to the shuttle when the shuttle has said movement along said shuttle race.

10. In an Axminster loom having a selvage thread shuttle normally stationary and movable along a fixed path and returning to the normal position thereof to pass through a loop of weft laid by a weft needle, a selvage thread detector mounted for movement into detecting engagement with the thread in the shuttle when the latter is in the normal stationary position thereof, and means acting in timed relation with respect to the movement of the shuttle to cause said detector to move into detecting engagement with the thread in the selvage shuttle when the latter is normally at rest to detect the condition of said thread and cause the detector to be out of detecting engagement with respect to the thread when the shuttle moves along said path.

11. In an Axminster loom having a metallic selvage shuttle race along which travels a metallic selvage shuttle containing a metallic spool contacting the shuttle and wound with non-electric conducting selvage thread, an electric selvage thread detector finger to detect the condition of thread in said shuttle and contact said spool electrically when the latter is depleted of thread, a mounting for the finger with respect to which the latter is insulated, said mounting being electrically connected to the race shuttle and spool, and electric circuit means containing a source of electric power and the finger and having parts thereof electrically connected to the shuttle race and said circuit means being closed by engagement of the detector finger with the depleted metallic spool.

12. In an Axminster loom having a metallic shuttle race along which travels a metallic shuttle containing a metal spool contacting the shuttle, loom operation serving to deplete a selvage thread supply in the shuttle to expose the spool, an electric selvage thread detector finger to engage the thread at periodic intervals and contact the spool when the thread is depleted, a mounting for the finger insulated with respect thereto, said mounting being grounded to and electrically connected with the shuttle race, bobbin and spool, an electrically operated signal, a source of electric power, and circuit means including provision for grounding one side of the source of power and connecting the other side of said source of power to the signal and finger to effect closure of said circuit means during any of said periodic intervals when the spool is depleted of

selvage thread and engages the finger.

13. In an Axminster loom having a selvage shuttle provided with a selvage thread, an electric selvage thread detector finger for the shuttle, an electrically actuated signal, a source of electric power, means to present the finger to the shuttle to detect the condition of the selvage thread at periodic intervals, and electric circuit means including said source of power, signal and detector closed at each of said intervals subsequent to depletion of thread in the shuttle to cause intermittent operation of the signal.

14. In an Axminster loom having a fixed selvage shuttle race and a selvage shuttle moving along the race and carrying a bobbin having wound thereon a selvage thread of non-electric conducting material, said race, shuttle and bobbin being made of electric current conducting material, an electric selvage thread detector, and periodically acting means to present the detector to the bobbin to determine the condition of selvage thread in said shuttle and cause the detector to indicate exhaustion when the thread has become depleted.

15. In an Axminster loom having a selvage shuttle, a selvage thread carrying spool having an electric current conducting body normally covered by selvage thread and mounted in the shuttle to rotate as the thread is consumed, said body being uncovered when the spool is depleted, an electric selvage thread detector for engagement with said body, and means to move the detector against said body to indicate thread exhaustion when said body is uncovered, rotation of the spool due to unwinding of the thread causing different surfaces of the body to have contact with the detector.

16. In an Axminster loom having a selvage shuttle race, a selvage shuttle resting on said race and guided thereby along a given path, an actuator for said selvage shuttle operative to move the shuttle along said path and prevent upward displacement of said shuttle from said path, and a thread detector for said selvage shuttle located along said path to detect the condition of thread in said shuttle, said actuator being in engagement with the shuttle to hold the latter in proper position on said race for cooperation with the detector during the detecting operation.

17. In an Axminster loom having a selvage shuttle race, a selvage shuttle containing a bobbin provided with selvage thread located on said race and movable therealong in a given path, an actuator for said shuttle remaining in operating relation with respect to the shuttle at all times and moving said shuttle along said path, and a thread detector to detect the condition of selvage thread on said bobbin, said actuator and race cooperating to maintain the bobbin in detecting alignment with the detector and said actuator operative to move the shuttle to detecting position.

18. In an Axminster loom having a selvage shuttle race, a selvage shuttle provided with a supply of selvage thread and movable along said race, a thread detector located along said path to detect the condition of said supply of selvage thread in the selvage shuttle, and an actuator for the shuttle operative to move the shuttle along said race to detecting position with respect to the detector and cooperate with the race during the detecting operation to maintain said supply of selvage thread in position for proper cooperation with the detector.

19. In an Axminster loom having a selvage shuttle race, a selvage shuttle provided with a supply of selvage thread, a thread detector located along said race to determine the condition of said selvage thread, and an actuator for the selvage shuttle to reciprocate the latter along said race to present a selvage thread to the detector at regularly recurring intervals and cooperate with said race during said intervals to maintain the selvage shuttle in position for proper cooperation between the detector and the selvage thread.

20. In an Axminster loom operating with a selvage shuttle containing a supply of selvage thread, a shuttle race for the shuttle to guide the latter along a given path and prevent lateral and downward displacement of said shuttle from said path, a thread detector for the selvage thread located at a given point along said path, and an actuator for the shuttle operative to move the latter along said path to said given point to detecting position relatively to said detector and prevent upward displacement of the shuttle from said path when the shuttle is in said detecting position.

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