Jan. 15, 1946. J. GEIER 2,392,913

ELECTRICAL CONTROL APPARATUS

Filed Sept. 22, 1944

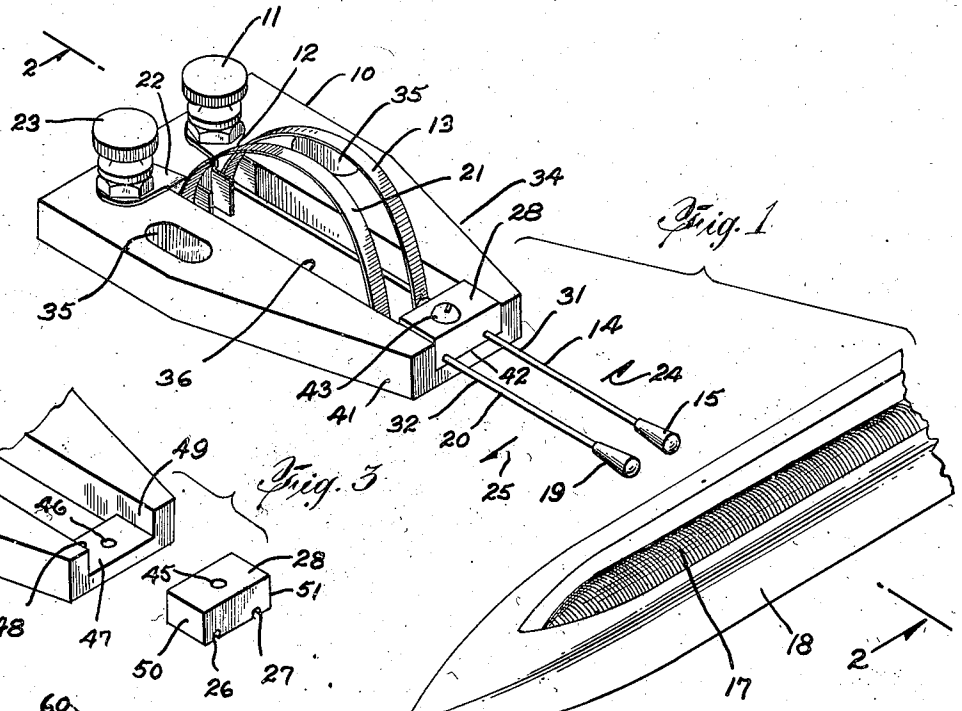


Fig. 1

Fig. 3

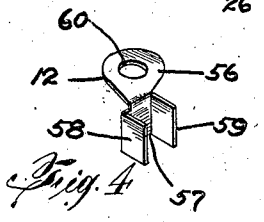


Fig. 4

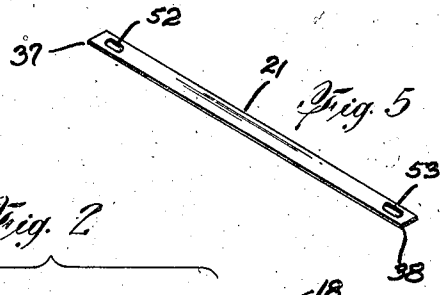
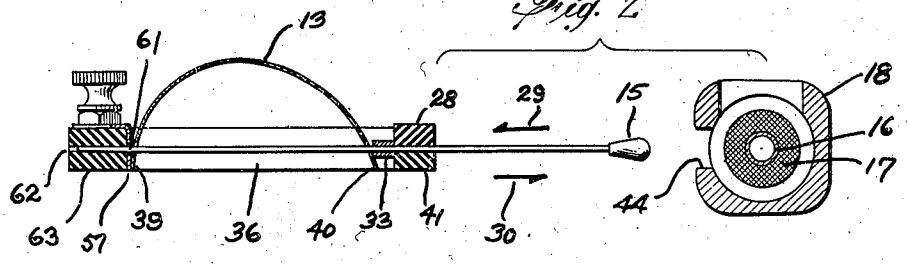


Fig. 5

Fig. 2



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ELECTRICAL CONTROL APPARATUS

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2 Claims. (Cl. 139—273)

This invention relates generally to electrical control apparatus and more particularly to an electrical sensing device for determining when the cop winding on a loom shuttle has become depleted.

In the field of automatically controlled power operated looms, electrical control devices are utilized in which sensing fingers, movably supported in the electrical control device, are adapted to enter the shuttle and contact the cop winding thereon. This sensing operation is preferably performed with each cyclical reciprocation of the shuttle so that upon the depletion of the cop winding the control may act to prevent damage or undesirable irregularity in the woven material produced by the loom.

Thus, the present control may be utilized to affect a stop motion which causes the weaving operation to cease until a new cop or pre-loaded shuttle may be manually installed in the loom; or on the other hand, the present electrical control may be used to effect the operation of a device associated with the loom and well known in the art to which the present invention relates, which upon the depletion of the cop in the then active shuttle, removes the empty shuttle from the shed and substitutes a second shuttle which is fully loaded with a thread winding of weft thread.

Electrical controls of this general nature have been known in the art but have been open to several objections in construction, operation and servicing which the present invention remedies. The present invention is, therefore, an improvement over the prior known structure. Because of the relatively high speed operation of looms in which the electric stop or shuttle shifting mechanisms are used, the sensing fingers are subject to considerable wear. This is particularly so at the relatively forward end of the electrical control. By virtue of this wear, the shape of certain of the parts of the electrical control are undesirably altered with a reduction in operating efficiency. This is extremely disadvantageous and particularly so where a bank of looms is being operated by relatively few weavers and loom fixers. Thus, if the electrical control fails to operate properly the continuation of the weaving process with the empty shuttle deleteriously affects the finished cloth. The foolproof operation of the device over continuously long periods, is, therefore, of paramount importance.

Another disadvantage of prior art structures lies in the fact that in order to produce an adequately sensitive sensing movement of the sensing fingers, highly resilient light weight springs are desirable. Owing to the very great number of flexures produced in the springs during operation, they are subject to fracture, particularly if they are of non-regular shape at the irregularities in the shape thereof. In accordance with the present invention the springs are of regular configuration and may be fabricated from a continuous strip having uniform resiliency characteristics throughout.

Since looms with which the present class of device is used, are operated over long periods of time in order to maintain continuously perfect operation, it is desirable that parts may be replaced after failure with a minimum of time and labor. It is, therefore, among the objects of the present invention to provide an electrical control device which may be readily serviced and have worn parts thereof quickly replaced so that weaving time lost is reduced to a minimum.

Since the springs have a relatively shorter life than the rest of the device and constitute a replaceable item, it is important that they be of relatively low cost and the present improved spring construction and mounting therefor, results in a substantial saving in cost.

It is further among the objects of the present electrical control, to remedy the foregoing described disadvantages of prior art construction.

Another object herein lies in the provision of novel sensing finger support construction wherein the portions thereof subject to greatest wear may be quickly and easily replaced.

These objects and other incidental ends and advantages will more fully appear in the progress of this disclosure and be pointed out in the appended claims.

In the drawing in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a view in perspective, showing a preferred embodiment of the invention in juxtaposition with a shuttle.

Figure 2 is a sectional view seen from the plane 2—2 on Figure 1.

Figure 3 is a fragmentary view in perspective taken similarly to Figure 1 and showing the forward end of the device with the forward sensing finger guide block disengaged.

Figure 4 is a view in perspective of one of the rear sensing finger guide terminals.

Figure 5 is a view in perspective of one of the sensing finger springs.

In use, electrical current enters the device 10 let us say, through the binding post 11 and the

rear sensing finger guide terminal 12. From this point the electrical current travels through the spring 13 and the sensing finger shank 14 to the tip 15, thence through the metal core 16 of the cop 17 in the shuttle 18. From this point current travels through the tip 19, the shank 20 and the spring 21 through the rear sensing finger guide terminal 22 and through the binding post 23. This electrical current may then be conducted in a well known manner to suitable relays or other electrical devices which will either signal the fact that the circuit has been completed through the core 16 or which will actuate mechanisms which will supply the shuttle 18 with a replenished cop 17. As viewed in the drawing, the movement of the shuttle 18 is longitudinal thereof as viewed in Figure 1, or to and from the viewer as viewed in Figure 2. Because of the friction against the tips 15 and 19 caused by the winding on the cop 17 as the tips enter the slot 44, the shanks 14 and 20 are subjected to considerable stress in the directions of the arrows 24 and 25. This causes considerable wear in the side walls of the grooves 26 and 27 in the forward sensing finger guide block 28.

As best seen in Figure 2, reciprocation of the shanks 14 and 20 in the directions of the arrows 29 and 30, causes a bowing or flexure of the springs 13 and 21. The fingers 31 and 32 are normally disposed in the outermost position thereof, as shown in Figures 1 and 2 when the tips 15 and 19 do not engage the shuttle or cop. They are resiliently urged into this position by the springs 13 and 21. When the tips 15 and 19 engage the shuttle or cop, they are urged rearwardly or in the direction of the arrow 29 against the resilient action of the springs 13 and 21. Forward movement of the fingers 31 and 32 is limited by detents 33 which may be in the form of stationary collars on the shanks 14 and 20.

The device 10 includes a main body 34 of irregular configuration best seen in the drawing and the body 34 is preferably composed of insulating material such as vulcanized fiber. The body 34 may be provided with a pair of openings 35 by means of which it may be adjustably secured to the frame or some attachment to the frame of the loom (not shown) so that said body may be maintained in proper operative position so that the tips 15 and 19 may correctly engage the shuttle, particularly the slot 44. The body 34 is provided with a central orifice 36 and it is within this orifice that the ends 37, 38, 39 and 40 of springs 21 and 13, respectively, are disposed (see Figure 2). Disposed at the front portion 41, the body 34 is provided with a recess 42 which is adapted to receive the block 28 and said block is adjustably secured in place by means of the screw 43 which penetrates an orifice 45 in the block 28 and threadedly engages the orifice 46 on the platform 47 disposed between the portions 48 and 49 which are adapted to slidably engage the ends 50 and 51 of the block 28.

The springs 13 and 21 are substantially identical and as best seen in Figure 5 are elongated and of substantially uniform width and thickness. Each of the springs 13 and 21 is provided with orifices 52 and 53 adjacent the ends thereof and these orifices 52 and 53 are preferably elongated so that the ends of the springs do not bind upon the shanks 14 and 20 of the fingers 31 and 32. Since as contrasted with prior art constructions there are no lateral extensions upon the springs 13 or 21, the same may be readily blanked from narrow strip stock with substantially no waste. Furthermore, since the ends are regular and there are no projections with angles or crevices, fracture of the spring due to fatigue of the material therein does not occur as frequently as with prior art structures.

In view of the fact that the terminals 12 and 22 are substantially identical except that one is a left hand one and the other is a right hand one, a detailed description of one will suffice for both. Thus in Figure 4 is seen a view in perspective of the terminal 12 which includes a binding post engaging portion 56, a spring rear and finger shank engaging portion 57 and spring side guiding portions 58 and 59. This part 12 may be stamped, punched and formed from a single piece of planar material such as brass. The portion 56 is provided with an orifice 60 through which is passed the bolt of the binding post (not shown). The portion 57 is disposed at substantially right angles with relation to the plane of the portion 56, and the portions 58 and 59 are spaced and parallel and are each at right angles to the portion 57. As best seen in Figure 2, the portion 57 is provided with an orifice 61 which is co-axial with an orifice 62 in the rear portion 63 of the body 34.

Thus, each of the shanks 14 and 20 may reciprocate longitudinally thereof within the body 34, the forward portions of said shanks being supported against lateral displacements by the grooves 26 and 27 and at the rear portions thereof by the orifices 62 and the orifices 61. The orifices in the springs 13 and 21 being penetrated by the shanks of the sensing fingers, are prevented from moving away from the body 34 and said springs are prevented from twisting about the shanks 14 and 20 as axes, by the engagement of the rear portions of said springs with the portions 58 and 59 on the guide terminals 12 and 22.

It may thus be seen that I have disclosed a novel and useful electrical sensing device for use upon looms, which is extremely sensitive and which may have long periods of effective operation. When after a long period of use, the grooves 26 and 27 become worn so that their side walls no longer properly position and slidably support the shanks 14 and 20, it is a relatively simple matter to release the screw 43 and to replace the block 28 with a new one in which the grooves 26 and 27 have their proper size. In the event of a spring breakage either the spring 13 or 21, it may be quickly replaced by removing the screw 43 which allows the block 28 to be moved forwardly. This permits the detent 33 to be moved forwardly sufficiently to unseat the rear end of either of the shanks 14 or 20 from the orifices 62 and the orifices 61 so that the broken portions of the spring may be slid off the rear terminal of the shank in question. After a new spring has been replaced by the penetration of the orifices therein by the particular shank of the sensing finger, the rear end of the shank is reseated and the block 28 replaced.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

I claim:

1. An electrical sensing device for closing a circuit therethrough with a conductor carried by the core of a cop on a loom shuttle, comprising: a sensing finger; a body spring having parallel side edges which are straight when the spring is

unflexed and having an orifice in each end thereof; said sensing finger penetrating said orifices; and means to prevent rotation of said spring about said finger as an axis.

2. An electrical sensing device for closing a circuit therethrough with a conductor carried by the core of a cop on a loom shuttle, comprising: a sensing finger; a body spring having parallel side edges which are straight when the spring is unflexed and having an orifice in each end thereof; said sensing finger penetrating said orifices; and means to prevent rotation of said spring about said finger as an axis; said means including a rear sensing finger guide terminal including a pair of spaced and parallel portions adapted to engage the longitudinal side edges of said spring.

JAMES GEIER.