April 5, 1932. O. V. PAYNE 1,852,217

ELECTRIC WARP STOP MOTION

Filed March 27, 1929 2 Sheets-Sheet 1

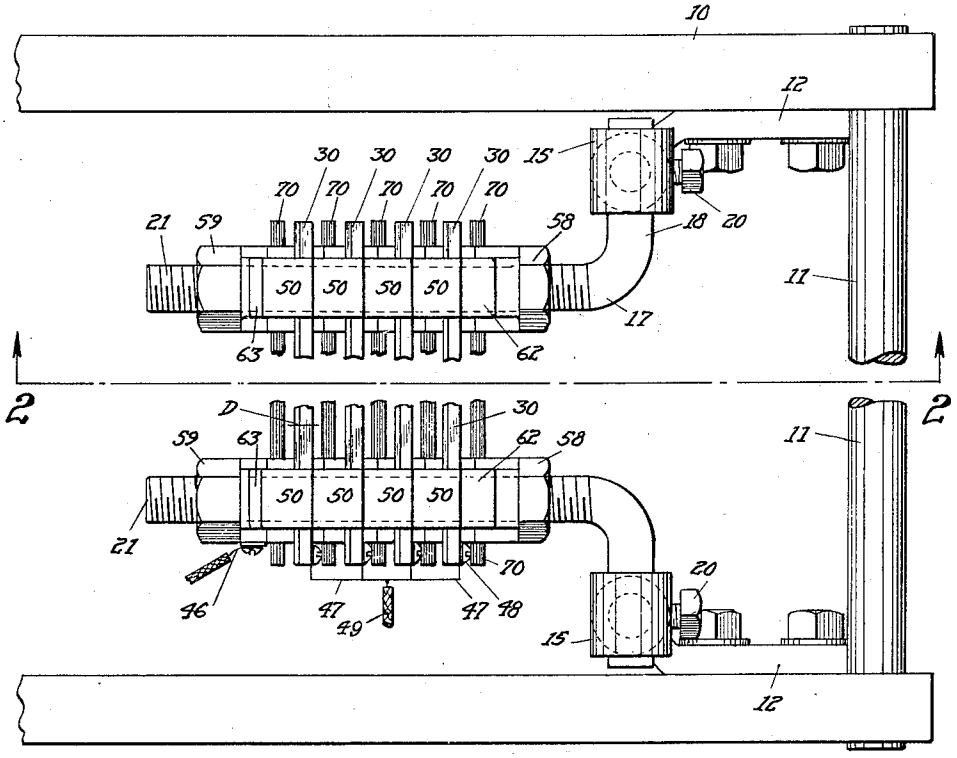

Fig. 1

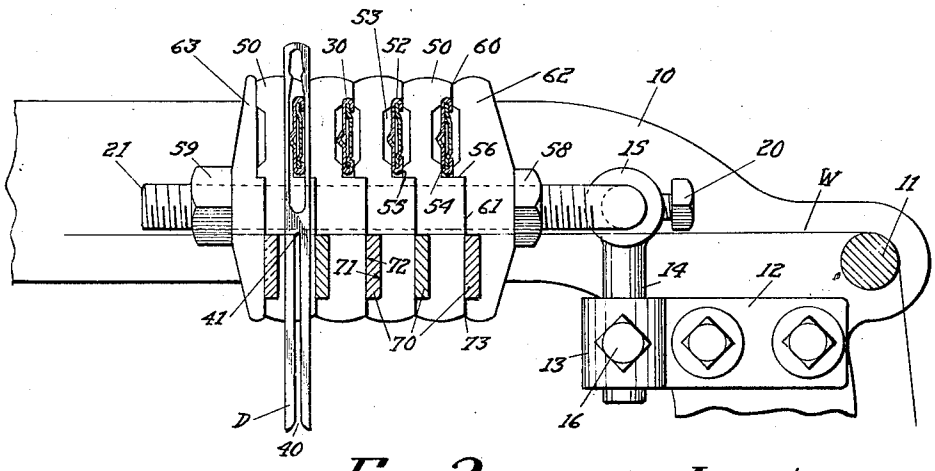

Fig. 2

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ELECTRIC WARP STOP MOTION

Filed March 27, 1929 2 Sheets-Sheet 2

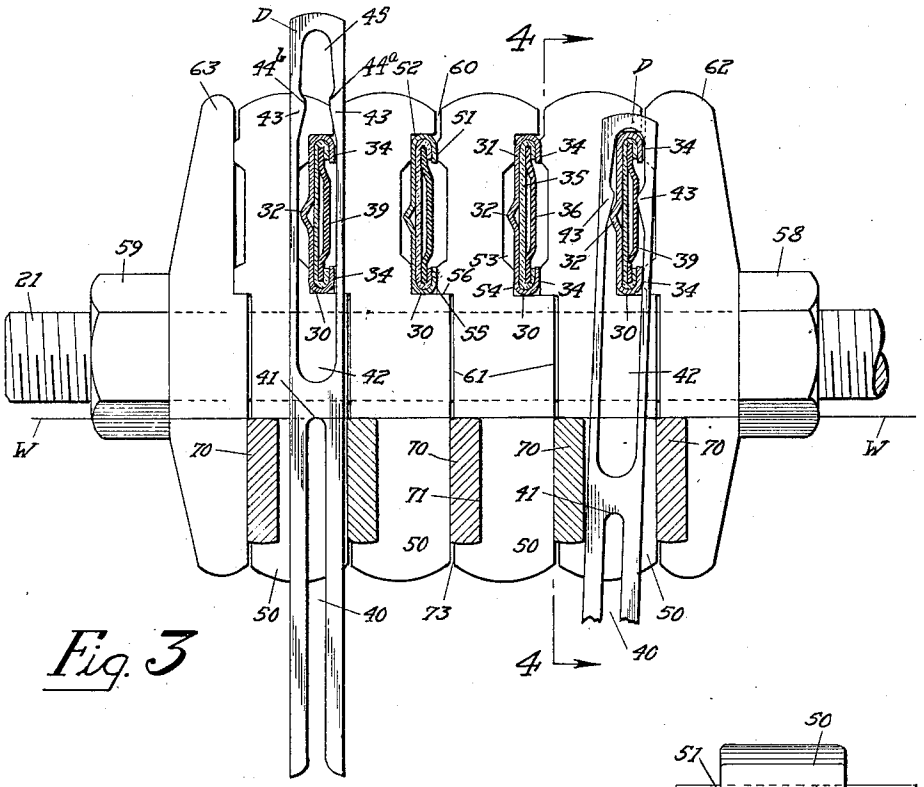

Fig. 3

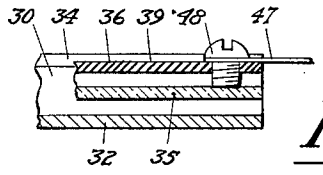

Fig. 5

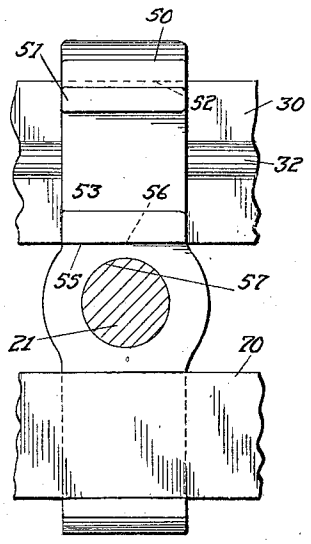

Fig. 4

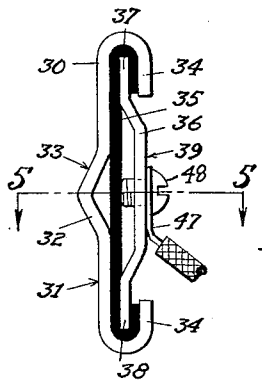

Fig. 6

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UNITED STATES PATENT OFFICE

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ELECTRIC WARP STOP MOTION

Application filed March 27, 1929. Serial No. 350,401.

This invention relates to improvements in electrical warp stop motions for looms, warpers and similar machines, and it is an important object of the invention to provide a motion of this type which is substantial in construction and so designed as to prevent injury to the contacting elements.

In the usual form of electrical warp stop motion there is employed a contact bar having a lower base portion connected to one side of the circuit and provided in its upper edge with a groove to receive a narrow strip which projects upwardly from the base member and is held out of contact with the base member by insulating material. Experience shows that the upwardly projecting contact strip is likely to become broken in handling because of the fact that it projects above the base and is not shielded or protected in any way. It is an important object of my present invention to provide a two-part contact bar, the portions of which are separated by insulated material, one of the parts being folded around the other so that said other part is protected and has no free end to extend beyond the confines or enclosing outline of the folding member.

It is a further object of my present invention to provide a drop wire to be used in connection with my improved contact bar having provision for electrically connecting both members of the bar when the drop wire is in fallen position. The drop wire and bar have cooperating parts so that as the drop wire falls it is moved transversely of the bar to bring a part thereof normally out of contact with any portion of the bar into contacting relation with the insulated member of the bar. This result may be accomplished by having a pair of inwardly extending projections formed on the face of the slot near the upper portion thereof, these projections contacting one with the bar which enfolds the insulated part and the other adapted for engagement with said insulated part.

It is a still further object of my invention to stiffen the contact bar by forming one of the members thereof with a rib which prevents twisting or bending, and I make use of this rib not only to strengthen the bar but also to cause the previously mentioned lateral movement of the drop wire to move the latter into engagement with the insulated member of the bar.

Different types of looms require different numbers of banks of drop wires, depending upon the loom and the grade of cloth being woven. On a gingham loom, for instance, two banks or two contact bars will suffice, whereas in some silk looms six bars are needed to take care of the greater number of warp threads for the same width of fabric. It has previously been customary to provide a different set of parts for each different size of warp stop motion, the motion employing only two banks having relatively small castings or parts to support the bars, and the motions having six banks using different and larger parts. It is a further and important object of my present invention to provide supporting structure for the contact bars, said structure being built up of a series of units of similar construction. In this way when it is desired to enlarge a two-bank motion to carry four or six or any other number of bars greater than two it is necessary merely to add another unit, retaining the previously used units.

As shown herein two adjacent units cooperate to hold one contact bar in position, the purpose of this construction being to permit a clamping of the outer member of the contact bar against the metallic units so that a good electrical contact may be established and preserved, but I do not wish to be limited to the application of the unit principle to an electrical warp stop motion, as I believe it is new in mechanical as well as electrical motions.

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 a convenient embodiment of my invention is set forth,

Fig. 1 is a top plan view of my improved motion, parts being broken away for the sake

of clearness, the invention being shown as applied to a loom,

Fig. 2 is a vertical section on line 2—2 of Fig. 1,

Fig. 3 is a view similar to Fig. 2 on an enlarged scale,

Fig. 4 is a vertical detailed section on line 4—4 of Fig. 3,

Fig. 5 is a detail horizontal section on line 5—5 of Fig. 6, and

Fig. 6 is an end elevation of one of the contact bars.

Referring particularly to Figs. 1 and 2, I have shown a loom frame 10 having a whip roll or warp guide 11 over which the warp W may pass. The warp beam is assumed to be at the right of Fig. 2 while the weaving instrumentalities are to the left thereof. Each loomside has secured thereto a bracket 12 having a hub 13 in which is slidably mounted ths vertical shank 14 of a holder 15. Screws 16, one for each of the hubs 13, hold the shanks 14 in adjusted vertical position. Angle bars 17 are provided, one for each side of the loom, and have relatively short arms 18 received by the hubs 15. Set screws 20 act to hold the arms 18 in adjusted longitudinal position with respect to the corresponding hubs 15. The bars 17 have relatively long horizontal extensions 21 which lie substantially parallel to the loomsides and also to the direction in which the warp is fed through the loom. The matter thus far described is of common construction, being substantially the same as that on a well-known type of mechanical warp stop motion.

My invention as set forth herein comprises essentially two important parts one of which is the contact bar that cooperates with the drop wire to establish an electric circuit and the other of which is a means for holding said bars in fixed position. I will describe first the bar and the drop wire with which it cooperates and then the support.

It is to be understood that drop wires are supported by the warp threads and are arranged in one or more rows extending transversely of the warp threads at a point preferably between the harnesses and whip roll of the loom. I wish it to be understood that although I am describing the present motion in connection with a loom, yet the motion is not limited to this type of machine as it can be applied to other machines such as warpers where the problem exists of stopping the machine upon warp failure. In electrical motions there are also employed electromagnets or batteries or other sources of current which have no direct bearing as to the particular form of my present invention and I have set forth herein only those parts of a warp stop motion which will actually make electrical contact upon the falling of a drop wire, it being understood that any of the approved forms of mechanism known for stopping the loom through electrical apparatus may be employed.

The contact bar, as shown more particularly in Figs. 3 and 6, comprises an outer enfolding member 30 having a substantially vertical surface 31, the intermediate portion of which may be provided with a crimp 32. Said crimp is formed so as to have an inclined upwardly facing surface 33 for a purpose to be described hereinafter. The top and bottom portions of the enfolding member are bent back toward the crimp substantially as shown in Fig. 6 and are each formed with a retaining wall 34 which extends toward the center of the bar but is spaced from the vertical wall 31.

A sheet of insulating material 35, such as fiber, is interposed between the member 30 and the second contact member 36. The latter member has upper and lower edges 37 and 38, respectively, which extend into the elongated pockets defined by the wall 31 and the walls 34. The second contact member is kept electrically out of contact with the first named member by means of the insulating strip 35 and is provided with a vertical surface 39 lying wholly within the enclosing outline of the outer enfolding contact member.

The relation of the enfolding member and the surface 39 is such that a straight line connecting the right hand surfaces of the walls 34, as shown in Fig. 6, will pass to the right of the surface 39, or in other words, the second contact member will lie between this imaginary line and the wall 31 and inclined surface 33. This is an important relation between the two parts and is rendered desirable by reason of the fact that the drop wires should not be able normally to have contact with the outer enfolding member and also the surface 39. As shown in Fig. 6 the crimp 32 is substantially intermediate the top and bottom of the surface 39, although I do not wish to be limited to this relation.

The drop wire D which cooperates with the contact bar is shown more particularly in Fig. 3 and has in the lower portion thereof an open slot 40 to facilitate threading the drop wire on the warp, said drop wire having a supporting surface 41 at the top of the slot to rest on the warp threads. The upper portion of the drop wire is provided with a preferably closed slot 42. As shown in Fig. 3 those portions of the drop wire which lie on the right and left sides, respectively, of the slot 42 adjacent the upper end of the latter are formed with inclined surfaces 43 which define contact points 44*a* and 44*b*, respectively.

The distance between said points is at least equal to and preferably slightly in excess of the thickness of the upper part of the bar. The slot 42 has an upward extension 45

wider than the distance between the points and projecting somewhat above them to receive the contact bar when the drop wire is fallen. It is to be noted that the drop wires are reversible about a vertical axis so that no particular care need be exercised in passing the contact bars through the slots 42.

Under normal conditions the drop wires will be in the raised position indicated by the drop wire at the left of Fig. 3 with the points and also preferably though not necessarily the cam surfaces 43 located above and out of engagement with the contact bar. When a warp thread breaks the corresponding drop wire will descend, the effect of which is to cause one of the inclined surfaces 43 to move the drop wire transversely of the bar, that is, to the right a short distance as viewed in Fig. 3. This movement of the drop wire will bring the contact point 44*b* over the crimp 32 so that upon a further descent of the drop wire said point will engage the surface 33 and move the drop wire in a reverse direction to cause the point 44*a* at the right as viewed in Fig. 3 to come in contact with the plate or member 36. When this latter condition takes place the two members of the bar will be electrically connected through the drop wire, the inclined surface 33 being in contact with one of the points and the member 36 being in contact with the other point. When this condition exists mechanism not shown will be set into motion to arrest movement of the loom.

As shown in Fig. 1 I have indicated a wire 46 which is in contact with a grounded part of the structure to be described and have shown a second wire 47 connected electrically to the second contact member 36 by means of screws 48 as shown in detail in Figs. 5 and 6. The latter wire is connected to all of the insulated contact members 36 and may connect with a wire 49 which is connected to loom stopping mechanism. As previously stated it is not considered necessary to set forth herein the particular electrically operated mechanism for stopping the loom when the two operating bars are electrically connected.

The contact members 30 and 36 may be made of any approved material and may be formed either by a rolling process in which case the bar will be continuous to be cut off in appropriate lengths after assembly, or said bar may be made by a pressing operation. In either case the bent enfolding walls of the outer contact member 30 will be clamped tightly against the insulation so that the latter will bind the inner contact member 36 to prevent relative longitudinal movement of said contact members.

While I have shown a particular means for connecting the insulated contact members 36 by means of a wire yet I do not wish to be limited to any particular means for connecting said insulated members together electrically, as the essential electrical features of my invention do not depend upon any particular manner of connecting the insulated members 36 to each other.

The second part of my invention relates particularly to the means for mounting the bars and also for insuring proper contact between said bars and the loom frame so that an effective ground for one side of the electric circuit may be provided. As shown more particularly in Figs. 2 and 3 I provide a plurality of units designated generally at 50. The units are substantially similar and a description of adjacent parts of two units and the manner in which they cooperate to hold in position the contact bar between them will suffice as a description for all of said units. The right hand member of a pair is provided near the upper left corner thereof with a short vertical surface 51 to bear against the right upper side of the corresponding contact bar, in this instance the upper wall 34. That part of the left member opposite the surface 51 is provided with a notch 52 into which extend the upper part of the contact bar. The horizontal dimension of the notch is slightly less than the thickness of the adjacent part of the contact bar, there being a space 60 between the upper ends of the members 50 to permit clamping of said contact bar in the notch by surface 51.

The left member has a depression 53 into which projects the crimped part 32 of the contact bar. A second notch 54 in the left member located preferably under notch 52 receives the lower end of the contact bar, and the latter is held tightly in the notch 54 by a short vertical surface 55 on the right member under and serving the same function as surface 51. It will be understood that when two adjacent members 50 are pressed toward each other the contact bar between them will not only be held in place but will have good electrical contact with the members.

The top and bottom of notches 52 and 54, respectively, are parallel horizontal surfaces which are spaced by a distance substantially equal to the height of the contact bar, so that the latter acts to prevent angular movement of the member 50 which receives it. If desired, the right member 50 may have a downwardly facing horizontal surface 56 to engage the bottom of notch 54 to prevent relative motion between adjacent members 50. The units or members 50 are each provided with a bore 57 through which extends the supporting element 21, and as there is one of the latter at each side of the loom it will be apparent that the bars and members will be held rigidly in place when said members are pressed together.

As shown in Fig. 2 the right hand unit is engaged by a clamping element 62 the left side of which is similar to the left sides of

the units 50, but the right side of which is formed to receive the thrust of a nut 58 threaded on rod 21. The left hand member 50 as shown in Fig. 2 is engaged by a second clamping element 63 the right side of which is formed substantially as the right sides of the members or units 50, except that the notches 52 and 54, together with the depression 53 may be omitted. The left side of clamp 63 is formed to be engaged by a nut 59 also threaded on rod 21. By means of these two nuts the several parts of the support which are mounted on the extension or rods 21 may be clamped tightly together so as to insure tight contact between the units and the contact bars. Those portions of the units which are adjacent the extension 21 may be separated by a slight space 61 similar in purpose to the space 60.

In certain forms of warp stop motions it is desirable to have so-called separator bars which will assist in positioning the drop wires and I have indicated these generally at 70 in Figs. 1, 2 and 3. These bars may be received by slots 71 formed in the left hand side of each unit and also in clamping element 62 as viewed in Fig. 2. Each bar is held in its pocket by a vertical surface 72 of each unit and also on clamp 63. A small clearance indicated at 73 in Fig. 3 may be provided to permit tight binding of said separator bars between adjacent units, the spaces 73 being very small and less than spaces 60 and 61 so that if the separator bars are omitted very little distortion of the motion as a whole will result when the nuts 58 and 59 are tightened.

When it is desired to enlarge the warp stop motion to accommodate a greater number of drop wires such, for instance, as when a greater number of silk threads are to be placed in the warp, it is necessary merely to remove the nuts 59 and clamps 63 and place on the supporting extensions 21 as many additional units 50 as are required for the additional contact bars, after which the clamps and nuts may be replaced and tightened to insure proper engagement between the contact bars and the units.

From the foregoing it will be seen that I have provided a very simple form of contact bar which is of durable and strong construction, the crimp 32 and also the round upper and lower edges of the outer enfolding member tending to stiffen the bar to prevent the same from being bent out of normal position. It will also be seen that the contact bar is so formed that the insulated member lies entirely within the enclosing outline of the outer enfolding member so that accidental contact with a drop wire is impossible. It will also be seen that I have provided a a particular form of drop wire which is reversible, being symmetrical about a vertical axis, the drop wire having portions to cooperate with the elements of the contact bar so that the two members of the latter will be electrically connected when the drop wire falls, although the drop wire is ineffective to connect the members electrically when the drop wire is in normal raised position. Furthermore, it will be seen that any desired number of units 50 may be employed, depending upon the number of contact bars to be used, so that it is a very simple matter to enlarge a two-bank motion so that it will accommodate six or more banks of drop wires. Again, it will be seen that the units are so formed as to effectively clamp the contact bars in position not only to prevent longitudinal movement of the same but also to insure proper electrical connection.

A further and important feature of my invention relates to the fact that the drop wire, in order to connect the elements of the contact bar, must have a motion with a horizontal component, that is, the mere vertical motion of a drop wire or other metallic substance will not suffice to close the circuit which causes a change in the operation of the loom or other machine. Also, the contact surface is vertical, so as not to collect lint or dirt, and as a result a better contact with the drop wire is insured.

The devices for supporting the warp stop motion and particularly the built-up unit construction is not claimed herein but forms the subject-matter of a divisional application Serial No. 462,651, filed by me June 20, 1930.

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 electric warp stop motion, a drop wire of electric conducting material having a slot therein, a contact bar extending through the slot, said contact bar having an outer enfolding member to have engagement with the drop wire under normal conditions, and said bar having a second member lying wholly within the outline of the first named member and normally out of contacting position relatively to the drop wire.

2. In an electric warp stop motion, a drop wire having a slot therein, a contact bar extending through the slot and having two members, one member extending above and on both sides of the other member so that said other member is normally out of contacting position with respect to the drop wire, and means to cause the drop wire to move laterally into contacting relation with the said other member when the drop wire falls.

3. In an electric warp stop motion, a drop wire having a slot therein, a contact bar formed of two members electrically insulated

from each other, one of said members lying wholly within the outline of the other member and being normally out of contacting position relatively to the drop wire, and means to cause the drop wire to move laterally into electric contact with the first named member when the drop wire falls.

4. In an electric warp stop motion, a drop wire having a slot therein, a projection extending into the slot, a contact bar having two insulated members one of which is normally in position to be engaged by the drop wire and the other member of which lies under the first named member and normally out of contact with the drop wire, and means operative when the drop wire falls to move the projection into electrical contact with the said other member.

5. In an electric warp stop motion, a drop wire having a slot therein into which projects a contacting portion of the drop wire, a contact bar extending through the slot and having two members insulated from each other, one of said members lying above the other and normally acting with the drop wire, said other member being normally below the contacting portion of the drop wire, and means acting when the drop wire falls to move the contacting portion thereof laterally into engaging contact with the said other member.

6. In an electric warp stop motion, a drop wire having a slot therein, a projection extending into the slot, a contact bar formed of two insulated contact members, one of said members lying above and on each side of the other member and normally contacting with the drop wire, the other member being normally out of contact with the projection, and means acting as the drop wire falls to move the projection under the first named member and into electrical contact with the said other contact member.

7. In an electrical warp stop motion, a drop wire, a pair of insulated contact members mutually stiffening each other to be electrically connected by the drop wire upon warp fault, engagement of the drop wire with both members being dependent upon lateral movement of the drop wire to move a portion thereof into electrical contact with one of the members.

8. In an electrical warp stop motion, a drop wire, a pair of insulated contact members, one overhanging the other, said members to be electrically connected by the drop wire, the drop wire being dependent upon a lateral movement of a portion thereof under the overhanging member to establish electrical connection between the members.

9. In an electrical warp stop motion, a drop wire, a pair of contact members each of which assists in stiffening the other, said members being insulated from each other and capable of contacting with the drop wire at the same time, the drop wire depending upon a combined downward and lateral motion to have engagement with both members.

10. In an electrical warp stop motion, a drop wire having a slot therein, a contact bar extending through the slot and having two members insulated from each other, one of said members normally held out of contacting position relatively to the drop wire and having a substantially vertical contacting surface, and means effective when the drop wire falls to move a portion thereof into electrical engagement with the vertical surface.

11. A contact bar for an electrical warp stop motion, said bar comprising an inner member and an outer member insulated from the inner member, the outer member extending around three sides of the inner member and being pressed against the fourth side of said inner member so that the latter lies wholly within the outline of the outer member.

12. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one folded more than half way around the other but leaving a portion of said other member exposed and lying within a line extending parallel to the exposed part of the other member and tangent to the outer portions of the first member adjacent said exposed part.

13. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member being folded over the top and under the bottom of the other member, said other member lying below the folded overhanging part of the said first member irrespective of which side of the first member is uppermost.

14. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member being confined within the outlines of the other and having an exposed surface.

15. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member being held between confining portions of the other and having an exposed surface which lies between spaced confining portions of the other member, said confining portions being symmetrically disposed with respect to a central horizontal axis passing through both members.

16. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member extending over the other member so that said other member lies between vertical planes touching opposite horizontal extremities of the said one member.

17. A drop wire for an electrical warp stop motion operating with a contact bar having an inclined surface on one side and a contact surface on the opposite side lying within the outline of the bar, said drop wire having a

slot for the contact bar, and a pair of similar projections formed on the drop wire and extending into the slot, said slot being symmetrical about a vertical central axis passing through the slot, and the projections being opposite each other and on opposite sides of the axis when the drop wire is in vertical position.

18. In an electrical warp stop motion, a drop wire, a pair of contact members to be electrically connected by the drop wire, one of said members having a part overhanging the other member, and means acting on the drop wire as the latter falls to move the same into electrical connection with said other member.

19. In an electrical warp stop motion, a drop wire, having a hole therein, a pair of contact members to be electrically connected by and extending through the hole in the drop wire, one of said members having a part overhanging the other member, and means acting on the drop wire as the latter falls to move the same into electrical connection with said other member.

20. In an electrical warp stop motion, a drop wire, a pair of contact members to be electrically connected by the drop wire, one of said members having a part overhanging the other member, and means operative when the drop wire falls to cause said wire to be electrically connected to both members.

21. In an electrical warp stop motion, a drop wire, a pair of contact members to be electrically connected by the drop wire, means overhanging one of the members to keep the drop wire normally spaced from said member, and means to effect contact between the drop wire and both members when the drop wire falls.

22. In an electrical warp stop motion, a drop wire having a slot into which extends a projection and also an inclined edge, a contact bar extending through the slot and formed of two insulated members, one of said members lying above the other member and the the latter being normally out of engagement with the projection, the inclined edge acting when the drop wire falls to engage the first named member to move the projection laterally into contact with the said other member, the drop wire thereby electrically connecting the members of the bar.

23. In an electrical warp stop motion, a drop wire having a slot therein, a contact bar extending through the slot and having an upper portion to have contact normally with the drop wire, a contact member insulated from the upper portion of the bar, and a projection on the drop wire normally out of engagement with the contact member but capable of engagement therewith, contact of the member and projection being dependent upon lateral movement of the projection into electrical contact with the member and under the said upper portion of the contact bar.

24. In an electrical warp stop motion, a drop wire having a slot therein into which extend two substantially similar integral projections, a contact bar extending through the slot and having two members insulated from each other, one of said members being positioned to have contact with the drop wire normally and the other member positioned to be normally out of contact with the drop wire, and means effective upon falling of the drop wire to engage one projection and move the drop wire laterally to cause the other projection to have electrical contact with the second named member.

25. In an electrical warp stop motion, a drop wire having a slot therein into which extends two substantially similar projections, said slot and projections being symmetrical about a vertical axis, a contact member extending through the slot and normally below the projections, a second contact member insulated from the first named member, and means formed on the second member to be engaged by one of the projections when the drop wire falls to move the drop wire laterally to cause contact between the other projection and the first named member, thereby electrically connecting said members.

26. In an electrical warp stop motion, a drop wire having a slot therein into which extend two substantially similar projections, a contact bar extending through the slot and having two members insulated from each other, one of said members being positioned to have contact with the drop wire normally and the other member positioned to be normally out of contact with the drop wire, and means effective upon falling of the drop wire to engage one projection and move the drop wire laterally to cause the other projection to have electrical contact with the second named member, said drop wire being reversible so that either projection will cooperate with either member.

27. In an electrical warp stop motion, a drop wire having a slot therein into which extend two projections, one horizontally opposite the other, a contact bar extending through the slot and formed of two contact members which are insulated from each other, one of said members having a rib normally below the projections, and the other member having a contacting surface normally below the projections and normally out of engaging position relatively to the drop wire, the drop wire when falling due to a warp fault effecting engagement between the rib and one projection to move the drop wire laterally to bring the other projection into engagement with the second named member to connect the contact members electrically.

28. In an electrical warp stop motion, a drop wire having a slot therein, and a con-

tact bar in the slot and having two insulated members one of which lies above and also under the other member to prevent the ends of the slot from contacting with said other member.

29. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, both members having parallel vertical portions, the top of one member being folded over the top of the other member and extending partly down along the other side thereof, and the bottom of said one member being folded around the bottom of the other member and extending partly up along the opposite side of the latter, the folded parts being spaced to expose a portion of the other member and the latter lying between the outer limits of the folded part and the vertical portion of the said one member.

30. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member having a vertical wall formed with an upwardly facing inclined surface, said member enclosing more than half of the other member and having a part overhanging the other member, said other member having an exposed surface which is on the side of the contact bar opposite the side with the inclined surface.

31. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member formed with a vertical wall from which extends a rib having an upwardly and also a downwardly facing inclined surface, said one member having spaced similar parts which extend horizontally on both sides of the other member, said similar parts and the inclined surfaces being symmetrical about a horizontal axis passing between the inclined surfaces, so that said contact bar may be used with either edge up, a part of the said one member overhanging the other member whichever of said parts is uppermost.

32. A contact bar for an electrical warp stop motion, said bar comprising two insulated members one of which lies both over and under the other member.

33. A contact bar for an electrical warp stop motion, said bar comprising two contact members insulated from each other, one member held by the other member from movement in all directions transverse to the bar.

34. A contact bar for an electrical warp stop motion, said bar having two insulated members one of which is exposed through a horizontal opening in the other.

35. In a warp stop motion, a bar extending transversely of the warp threads, a bank of drop wires each having a slot therein through which the bar extends, a rib extending along the bar below the upper surface of the latter, a projection on the drop wire extending into the slot and adapted for engagement with the rib when the drop wire is fallen, the rib and projection of a fallen drop wire establishing a pivot around which the upper part of the drop wire swings when deflected laterally to cause the upper part of the slot in the fallen drop wire to engage the upper surface of the bar to resist further movement along the bar.

In testimony whereof I have hereunto affixed my signature.

OSCAR V. PAYNE.