Oct. 5, 1954 I. B. BASSINDALE ET AL 2,690,772

LOOM FOR WEAVING TUFTED PILE FABRICS

Filed March 16, 1950 4 Sheets-Sheet 1

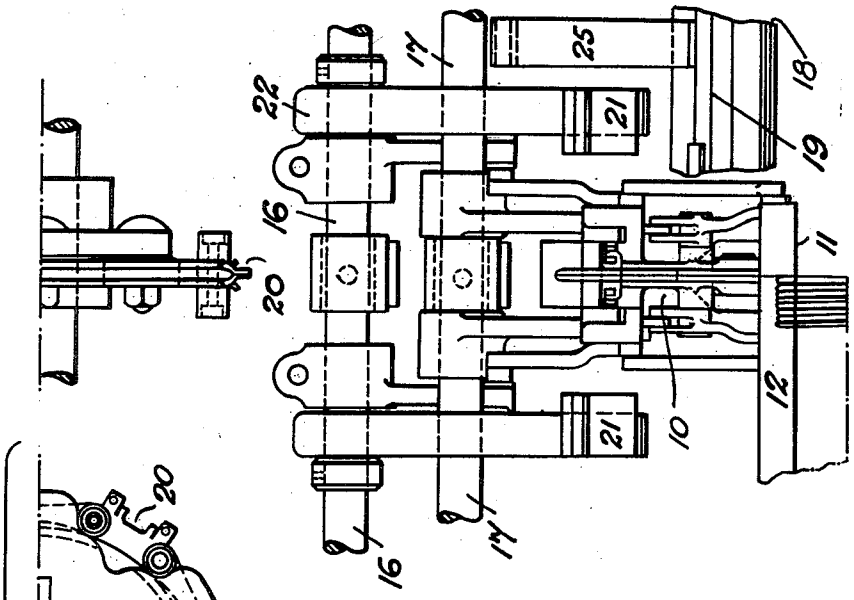

FIG. 2.

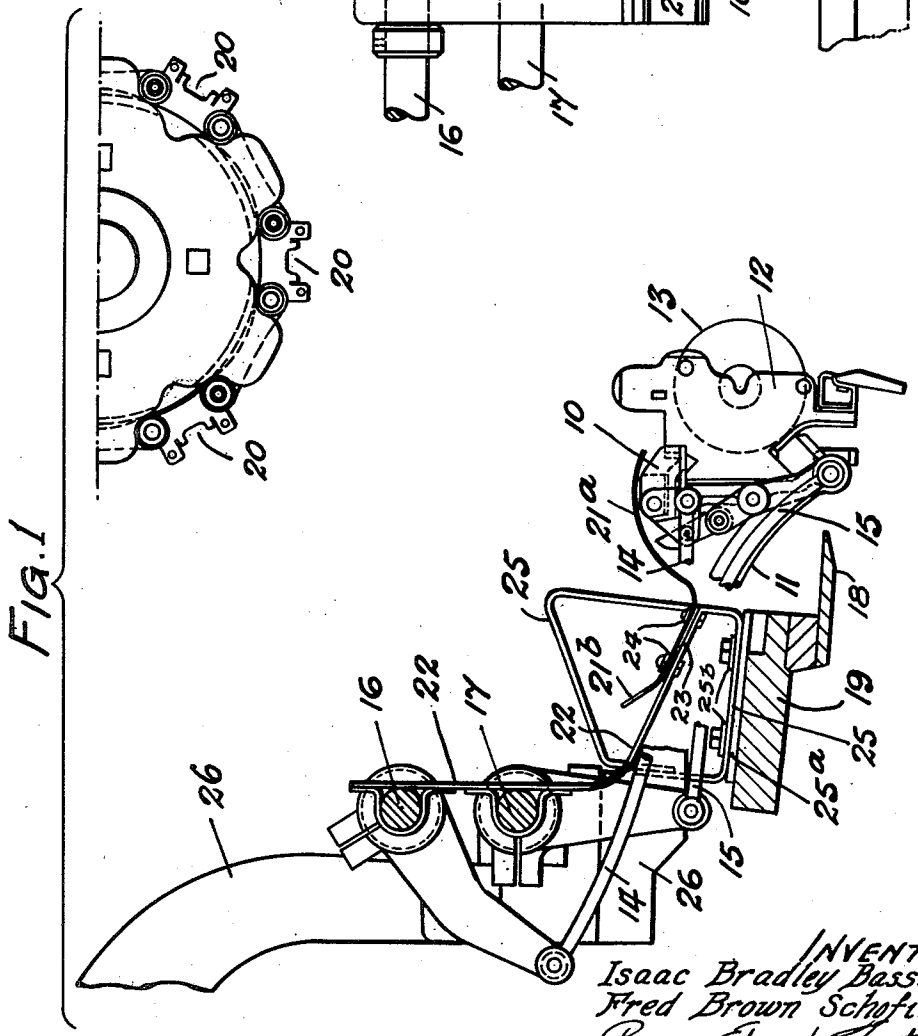

FIG. 1

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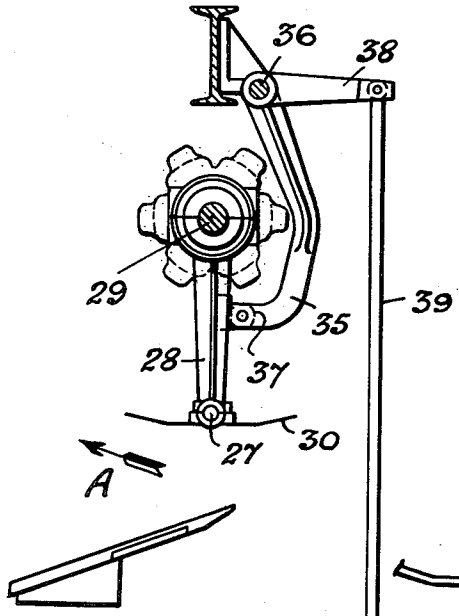
Oct. 5, 1954 I. B. BASSINDALE ET AL 2,690,772

LOOM FOR WEAVING TUFTED PILE FABRICS

Filed March 16, 1950 4 Sheets-Sheet 2



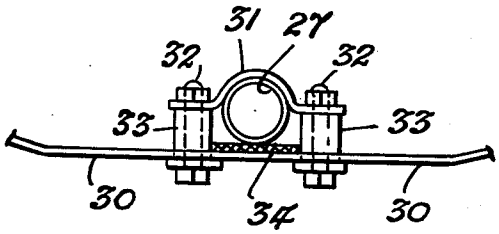


FIG. 5.

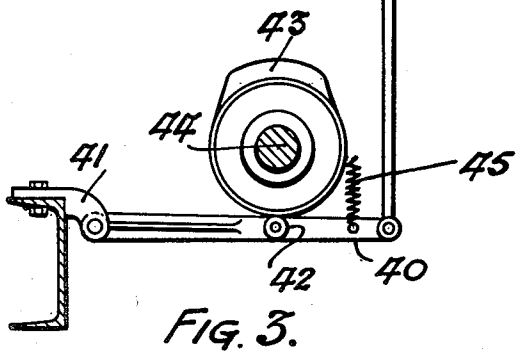


FIG. 3.

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Oct. 5, 1954 I. B. BASSINDALE ET AL 2,690,772

LOOM FOR WEAVING TUFTED PILE FABRICS

Filed March 16, 1950 4 Sheets-Sheet 3

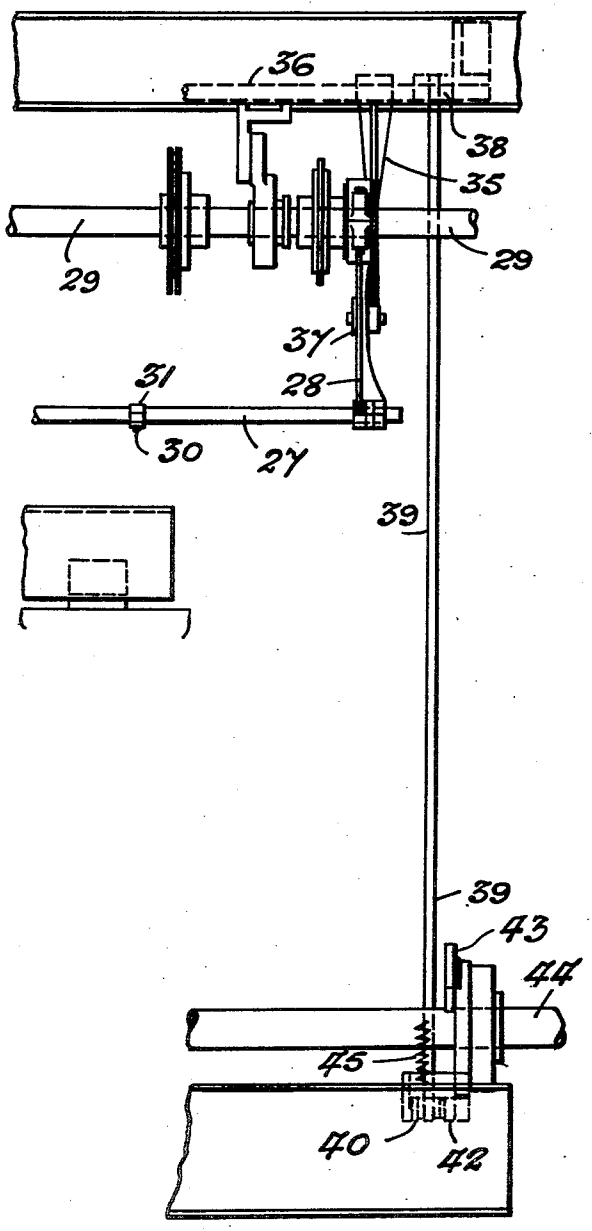

FIG. 4.

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Oct. 5, 1954 I. B. BASSINDALE ET AL 2,690,772

LOOM FOR WEAVING TUFTED PILE FABRICS

Filed March 16, 1950 4 Sheets-Sheet 4

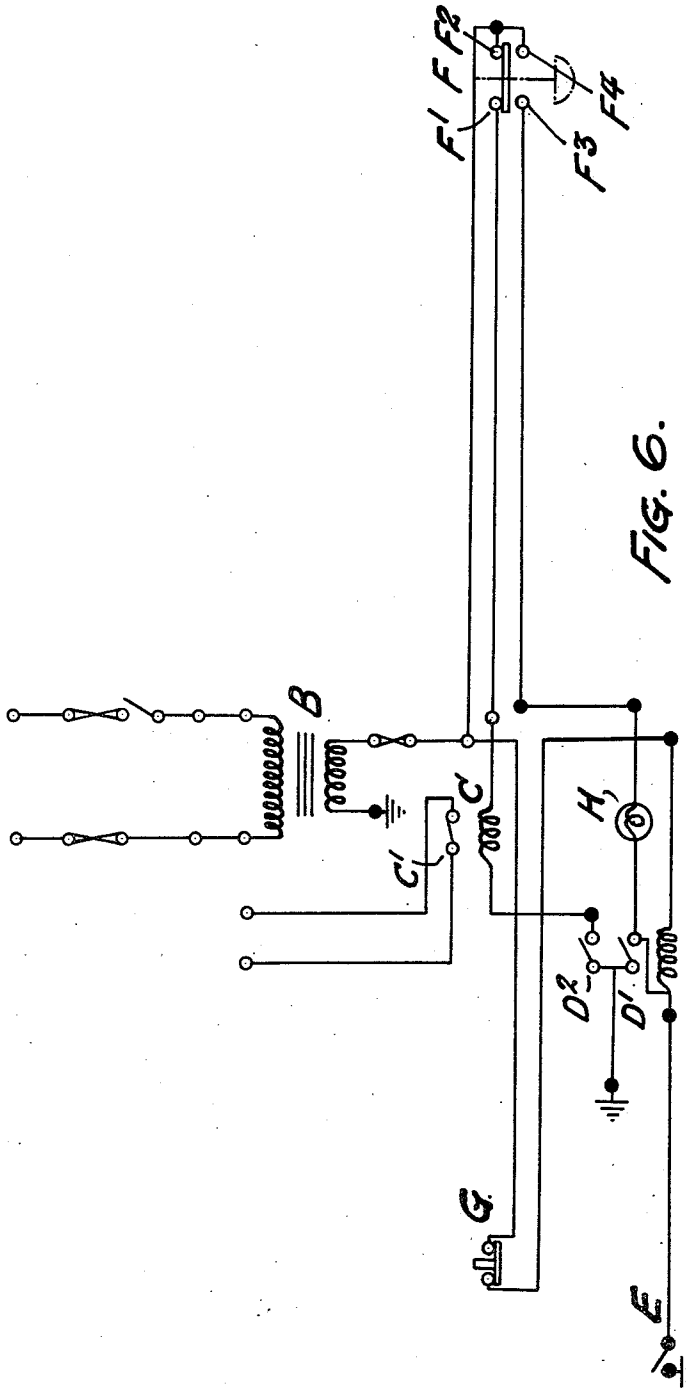

FIG. 6.

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UNITED STATES PATENT OFFICE

2,690,772

LOOM FOR WEAVING TUFTED PILE FABRICS

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Application March 16, 1950, Serial No. 159,531

Claims priority, application Great Britain March 17, 1949

3 Claims. (Cl. 139—336)

1

This invention of improvements in looms for weaving tufted pile fabrics relates to spool Axminster carpet looms in which tube frames for holding spools of tuft yarn are alternately engaged with and disengaged from carrying chains for conveying the tube frames and spools of tuft yarn in due order to and from the places at which they are required to be used for the supply of tuft-yarn for insertion between warp threads.

The removal and replacement of the tubes from and to the carrier chains is effected by transferring arms each furnished at its forward extremity with clasping means, the clasping means being adapted to engage with a tube frame at opposite ends thereof.

The transferring arms operated by cam mechanism are alternately moved forward and upwards to engage the lowermost tube frame in the carrying chains and to remove the said tube frame therefrom, the transferring arms then moving downwardly and rearwardly to bring the tube frame into correct position for tuft yarn to be inserted between the warp threads, and subsequently moving forwardly and upwardly to replace the tube frame in the carrying chains. The said movements being repeated for each tube frame in the carrying chains as the said tube frames are brought successively into position for removal.

It sometimes happens that a tube frame, which for any reason is not securely held in the carrying chain, falls from the carrying chains to the rear of the bobbin shaft and drops on to the transferring arms as the said arms are moving back in the normal manner to allow the next succeeding tube frame to come into operation. If this happens, the transferring arms in their next operative movement would jam and damage the loom.

The present invention has for its object the provision of means for catching said tube frame falling from the carrier chains in such manner as to prevent it rolling on to the clasping means, said means also being adapted to bring into operation electric stop motion mechanism to stop the loom immediately and so prevent damage occurring to any part of the loom.

According to the invention there is provided adjacent to each clasping means a curved plate so disposed as to prevent a fallen tube frame from rolling on to the clasping means in the movement of the transferring arms. The curved plate is insulated from its carrier bracket for a purpose later to be described.

In order to arrest undesirable movement of the fallen tube frame towards the rear of the

2

loom a further plate is fitted to the back knife stock adjacent to each transferring arm. This second-mentioned plate is also insulated from its seating.

The two insulated plates described each provide a contact terminal in a low-voltage electrical circuit, the other contact of which is formed by the transferring arms. The circuit embodies a relay in connection with the starter of the electro-motor for driving the loom.

A tube frame may fall from the carrying chains through various causes, e. g., slackening of the chains, a fault in the hook spring of the tube frame, or excessive vibration.

Should a tube frame falling from the carrying chains drop to the rear of the bobbin shaft it is caught by the transferring arms and comes into contact with the curved insulated terminal plate adjacent to the clasping means or with the insulated terminal plate on the back-knife stock and due to its contact with the transferring arms complete a low-voltage electrical circuit thereby to energise a relay which in turn operates the starter to break the electric circuit to the driving motor and bring about stoppage of the said motor whereupon the loom is brought to a standstill.

In order to prevent damage by a tube frame falling from the carrying chains towards the front of the loom there is provided along the front of the loom a shaft carried in brackets at opposite ends of the loom on which is mounted a multiplicity of curved arms insulated from the shaft and each forming a contact terminal in the low-voltage electrical circuit as previously described, the other terminal being the loom frame.

The said curved arms provide a cradle to receive a fallen tube frame.

The cradle is operated by a cam mechanism to give a clear path for the tube frames during the normal insertion of the tuft.

If a tube frame falls completely out of the carrying chains it is caught by the said curved arms and in touching any part of the loom frame completes a circuit which stops the loom as previously described.

Should only one end of a tube frame fall out of a carrying chain, the swinging end of the tube frame is caught by a curved arm which acts as one terminal and the contact of the opposite end of the tube frame in its carrying chain forms the second terminal to complete the electrical circuit and stop the loom.

It will be seen from the foregoing description that the risk of damage to a loom through the

dropping of a tube frame from the carrier chains is reduced to a minimum.

If a loom is furnished with a multiplicity of tube frames arranged end to end for weaving wide fabric visual and/or audible signal means may be embodied to indicate the section in which a tube frame has fallen.

If desired, a cut-out switch may be incorporated to cut out the electric stop motion to enable the operative to manipulate the loom manually by the method known as "inching," a signal device being provided to indicate when the cut-out switch is in operation.

The invention will now be described with reference to the accompanying drawings in which only so much of the loom is shown as is necessary for a clear understanding of the invention.

In the drawings Fig. 1, is a fragmentary side elevation, partly sectional, showing tube-frame transferring mechanism with the invention applied thereto, also showing part of a carrying chain.

Fig. 2 is a fragmentary front view of the parts shown in Fig. 1; Fig. 3 is a side elevation, partly sectional, showing the application of an oscillating cradle forming part of the invention; Fig. 4 is a fragmentary front view of Fig. 3; Fig. 5 is a detail view, drawn to a larger scale, showing the construction of the oscillating cradle; Fig. 6 is a diagram of the electrical circuit of the electric stop motion.

The same reference characters indicate corresponding parts in the several figures of the drawings.

Referring to Fig. 1 of the drawings in which only so much of the loom and the tube frame transferring mechanism is shown as is necessary for a clear understanding of the invention 10 indicates clasping mechanism of known construction carried by a transferring arm 11, broken away so as not to obscure the figure, 12 indicates a tube frame carrying a spool of tuft yarn 13; 14 and 15 the operating levers of the clasping mechanism in operative connection with the shafts 16, 17 respectively, of the transferring mechanism. 18 indicates the back knife and 19 the back knife stock; 20 indicates the tube frame carrying chain.

All these parts are of known construction and operate in known manner it being also understood that there are similar parts intermediate of and at the opposite side of the loom.

The back knife 18 carried by the back knife stock 19 is adapted to co-operate with a front knife carried by a front knife stock, not shown, but constructed and operating in known manner.

According to the invention in order to catch a tube frame falling from the carrier chains 20 in such a manner as to prevent it rolling on to the clasping means 10 there is provided a curved plate 21 secured on a bracket 22 carried from the shafts 16, 17, in such a manner as not to interfere with the oscillation of the shafts 16, 17. The curved plate 21 is insulated from the bracket 22 by insulation material indicated at 23, 24.

The curved plate 21 is so shaped at 21^a as to provide a canopy extending above but to one side of the clasping means 10, see Figs. 1 and 2, and its opposite edge is bent at 21^b to provide a stop, the described construction of the curved plate 21 ensuring that a tube frame falling from the carrier chains 20 will be caught and prevented from rolling on to the clasping means 10 in the movement of the transferring arms 11. In order to prevent the fallen tube frame from moving towards the rear of the loom a further plate 25 is secured to the back knife stock 19 adjacent to the curved plate 21. The plate 25 is insulated from the knife stock 19 by insulation material indicated at 25*a*, 25*b*.

The two insulated plates 21, 25 each provide a contact terminal in a low voltage electrical circuit of electric stop motion means, the other contact of which is formed by any part of the loom frame, part of which is indicated at 26.

Should a tube frame falling from the carrying chains drop to the rear of the bobbin shaft it is caught by the curved insulated terminal plate 21 or the insulated terminal plate 25 on the back knife stock 19 and due to its contact with a part of the loom completes a low voltage circuit to operate the stop motion means whereby the loom is brought to a standstill. The operation of the stop motion circuit will be described later.

The means for preventing damage by a tube frame falling from the carrying chains 20 towards the front of the loom are illustrated in Figs. 3, 4 and 5. Said means includes a shaft 27 carried in brackets 28 pivotally mounted at opposite ends of the loom on the bobbin shaft 29 of the carrying chains 20. Mounted at spaced intervals in the shaft 27 are a multiplicity of curved arms or plates 30. Each arm or plate 30 is secured to the shaft 27 by a clamp 31 and bolts 32 and nuts. The bolts pass through flanged bushes 33 of insulation material and a block 34 of insulation material is interposed between the shaft 27 and the arm or plate 30 whereby said arm or plate 30 is insulated from the shaft 27, see Fig. 5.

Each arm or plate 30 forms a contact terminal, in the before mentioned low voltage electrical circuit, the other terminal being the loom frame.

The curved arms or plates 30 collectively form a cradle to receive a fallen tube frame.

Means are provided for moving the cradle out of the path of the tube frames in the normal working of the loom said means including a substantially curved lever 35 fast on a shaft 36 journalled in bearing brackets on the loom frame and furnished at its lower extremity with a bowl or roller 37 adapted to bear against the adjacent bracket 28. Fast on the shaft 36 adjacent to the lever 35 is a further lever 38, the distal end of which is connected by a connecting rod 39 to one end of a lever 40 pivoted at its opposite end in a bracket 41, secured to the lower part of the loom frame. The lever 40 is furnished with a bowl or roller 42 tracking a cam 43 on a shaft 44. The bowl or roller 42 is maintained in rolling contact with the cam 43 through the medium of a spring 45 connected at one end to the lever 40 and at the other end to any convenient part of the loom frame.

When the lever 40 is depressed by the action of the cam 43 the connecting rod 39 draws down the lever 38 and rocks the shaft 36 whereupon the lever 35 is rocked and the bowl or roller 37 pushes the bracket 28 in the direction of the arrow A to swing the cradle out of the path of movement of the tube frames.

As the cam 43 moves round, the cradle and the aforesaid linkage return to initial position by gravity assisted by the spring 45.

The sequence of operations of the electric stop motion will be described with reference to the diagram shown in Fig. 5, in which B indicates a transformer for low (safe) voltage; C indicates a trip relay with one normally closed contact indicated at C^1; D indicates a relay with two normally open contacts D^1, D^2; E indicates a trip contact

on the loom; corresponding to the contacts made by the tube frame falling on to the plates 21, 25, or cradle 30; F indicates a change-over push unit actuated by the loom starting handle, having four terminals F^1, F^2, F^3 and F^4; G indicates a reset button on the loom; H indicates a signal lamp.

The operation is as follows:

With the loom running normally, all the contacts and relays are as shown in the diagram. When a tube frame falls on to the insulated plates 21 or 25 or on to the cradle 30 and bridges the contacts the low voltage circuit is completed, i. e. contact is made at E thus energising the relay coil D and closing contacts D^1, D^2, contact D^1 providing an alternative path for electric current through the relay coil D, making the relay coil D self-retaining and now independent of the contact at E. The contact D^2 being closed provides a circuit through the contacts F^1, F^2 and relay coil C, thus breaking contact C^1 which causes the circuit to the electromotor to be opened automatically and so brings about stoppage of the loom, at the same time also releasing the change-over push unit F, breaking contact between F^1 and F^2 and bridging F^3 and F^4.

The relay coil C is now de-energised and C^1 returns to normal closed position. An alternative circuit then flows through contacts F^3, F^4, lamp H and contact D^1, thus indicating the causes of the stoppage.

The driving motor can be switched on if required and the loom "inched" at the operator's will, but, if the starting handle is moved to full "On" position before removal of the causes of stoppage, the stop motion will again act.

Having rectified the cause of the stoppage, the operator can then press the re-set button G, and the loom is again ready for running.

What we claim is:

1. In a spool Axminster carpet loom of the type referred to including transferring arms each furnished with clasping means, transferring mechanism shafts on which said transferring arms are mounted, bobbin shafts for carrying chains for conveying tube frames carrying spools of tuft yarn, a front knife and knife stock, a back knife and knife stock, a motor, a starting handle, and electric stop motion means embodying a low-voltage electrical circuit, in which there is provided means for catching a tube frame falling from the carrying chains and preventing it from rolling onto the clasping means or from moving towards the rear of the loom including a multiplicity of curved plates each positioned adjacent to the respective clasping means, brackets carried from the transferring mechanism shafts of the loom in such manner as not to interfere with the oscillation of said shafts and to which said curved plates are respectively secured, each of said curved plates providing at one edge a canopy extending above but to one side of the said clasping means and its opposite edge being bent to provide a stop, insulating means interposed between the respective curved plates and the supporting brackets, a multiplicity of angularly-bent plates each secured to the back knife stock of the loom adjacent to the respective curved plates, and insulating means interposed between the respective angularly-bent plates and the back knife stock, each of said curved and angularly-bent plates providing a contact terminal in the low-voltage electrical circuit of the electric stop motion means, the other contact terminal of which is formed by the loom frame whereby when the electrical circuit is completed the stop motion means is brought into operation to stop the loom.

2. A spool Axminster carpet loom as claimed in claim 1, including a swinging shaft, brackets carrying said shaft pivotally mounted at opposite ends of the loom on a bobbin shaft of the carrying chains, a multiplicity of curved arms freely mounted on said swinging shaft, insulating means interposed between each of said arms and said swinging shaft, each arm forming a contact terminal in the low-voltage electrical circuit of the electric stop motion means, said arms collectively forming a cradle, means for moving the cradle out of the path of movement of the tube frames in the normal working of the loom including a curved lever arm, bearing brackets on the loom frame, a pivot shaft journalled in said bearing brackets on which said lever arm is secured, a roller mounted in the lower extremity of said lever arm and adapted to bear against the adjacent bracket of the swinging shaft, a further lever fast on said pivot shaft, a connecting rod connected at one end to said lever, a rocking lever to which the opposite end of said connecting rod is secured, a bracket on the loom frame in which said rocking lever is pivoted, a roller mounted on said rocking lever, a cam-shaft mounted in bearings in the loom, a cam fast on said cam shaft, and a spring connected at one end to said rocking lever and at the other end to a part of the loom so as to hold the roller on the rocking lever in contact with the said cam, whereby when the said rocking lever is depressed by the action of the cam the linkage between the said rocking lever and the lever arm carrying the roller in contact with the bracket carrying the cradle causes the said lever arm to be rocked, whereupon the roller on the lever arm pushes the bracket to swing the cradle out of the path of movement of the tube frames, and subsequently, as the cam moves round, the cradle and the linkage return to initial position by gravity and spring influence.

3. A spool Axminster carpet loom as claimed in claim 2, in which the low-voltage electric circuit of the stop motion means includes a transformer for low voltage, a trip relay with one normally closed contact, a relay with two normally open contacts, a change-over push unit actuated by the loom starting-handle having four terminals, a reset button on the loom, and a signal lamp.

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