Jan. 19, 1954 E. S. BUTLER ET AL 2,666,458

SAFETY DEVICE FOR LOOMS FOR WEAVING TUFTED PILE FABRICS

Filed March 16, 1950 4 Sheets-Sheet 1

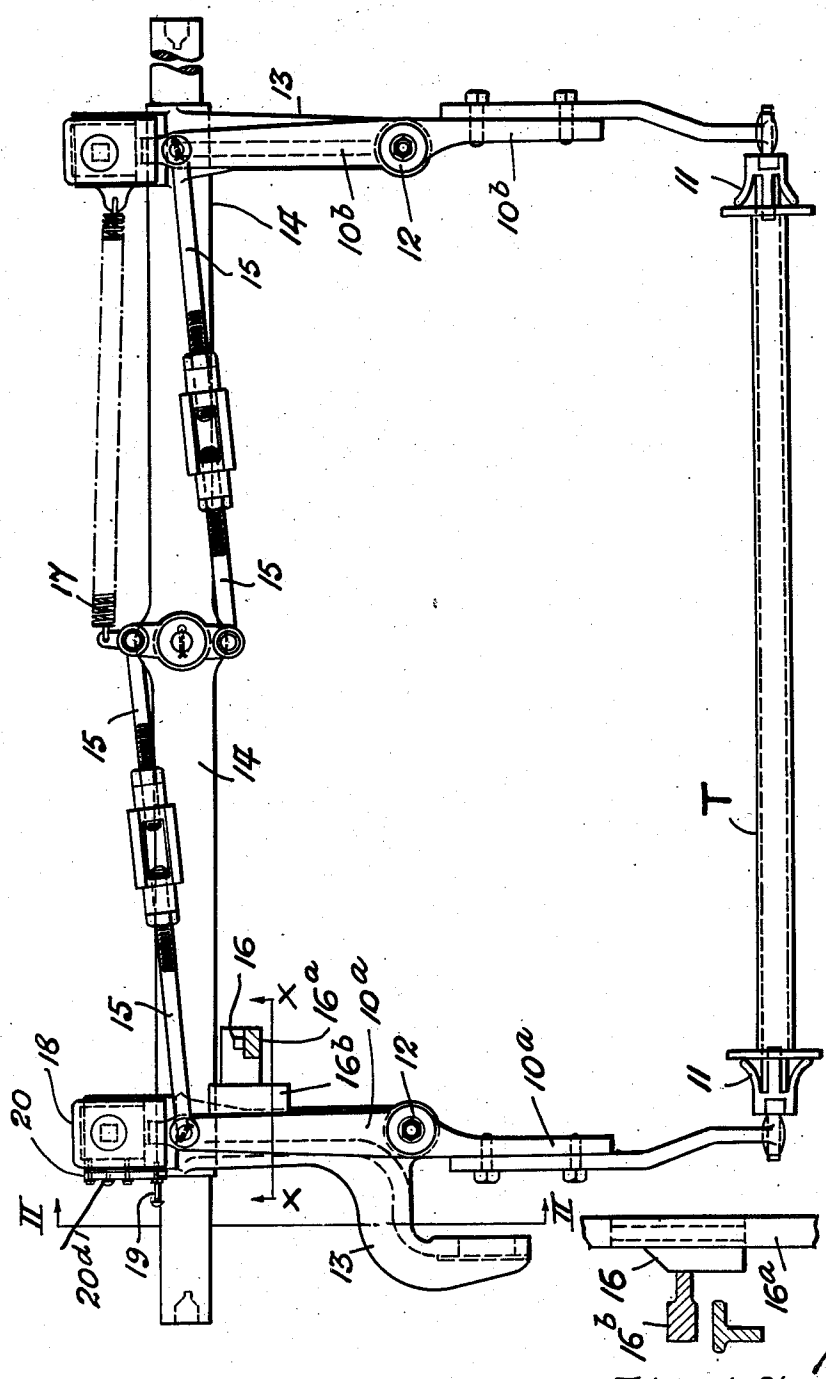


Fig. 1.

Fig. 1a

INVENTORS:
Edward Stanley Butler
Arthur Sutcliffe

BY THEIR ATTORNEYS:-
Dennis, Edmonds, Morton, Barrows and Taylor

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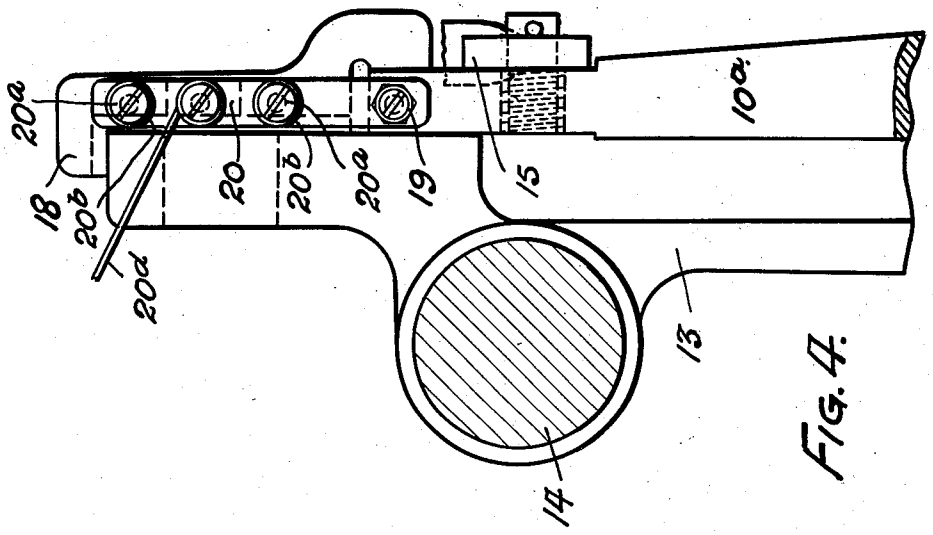


FIG. 4.

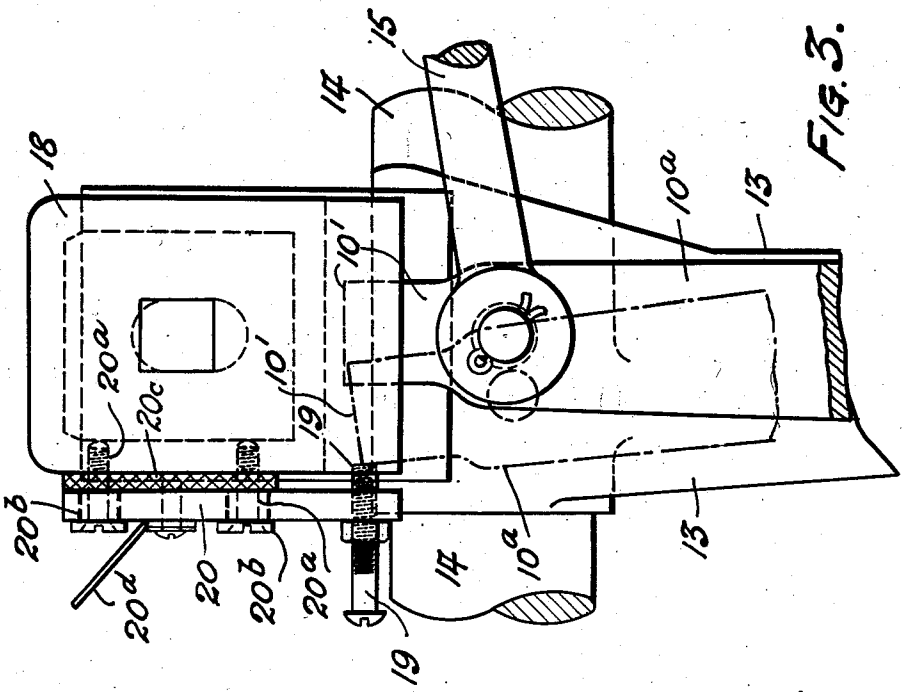


FIG. 3.

INVENTORS:-
Edward Stanley Butler
Arthur Sutcliffe

BY THEIR ATTORNEYS:- Pennie, Edmonds, Morton, Barrows and Taylor

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SAFETY DEVICE FOR LOOMS FOR WEAVING TUFTED PILE FABRICS

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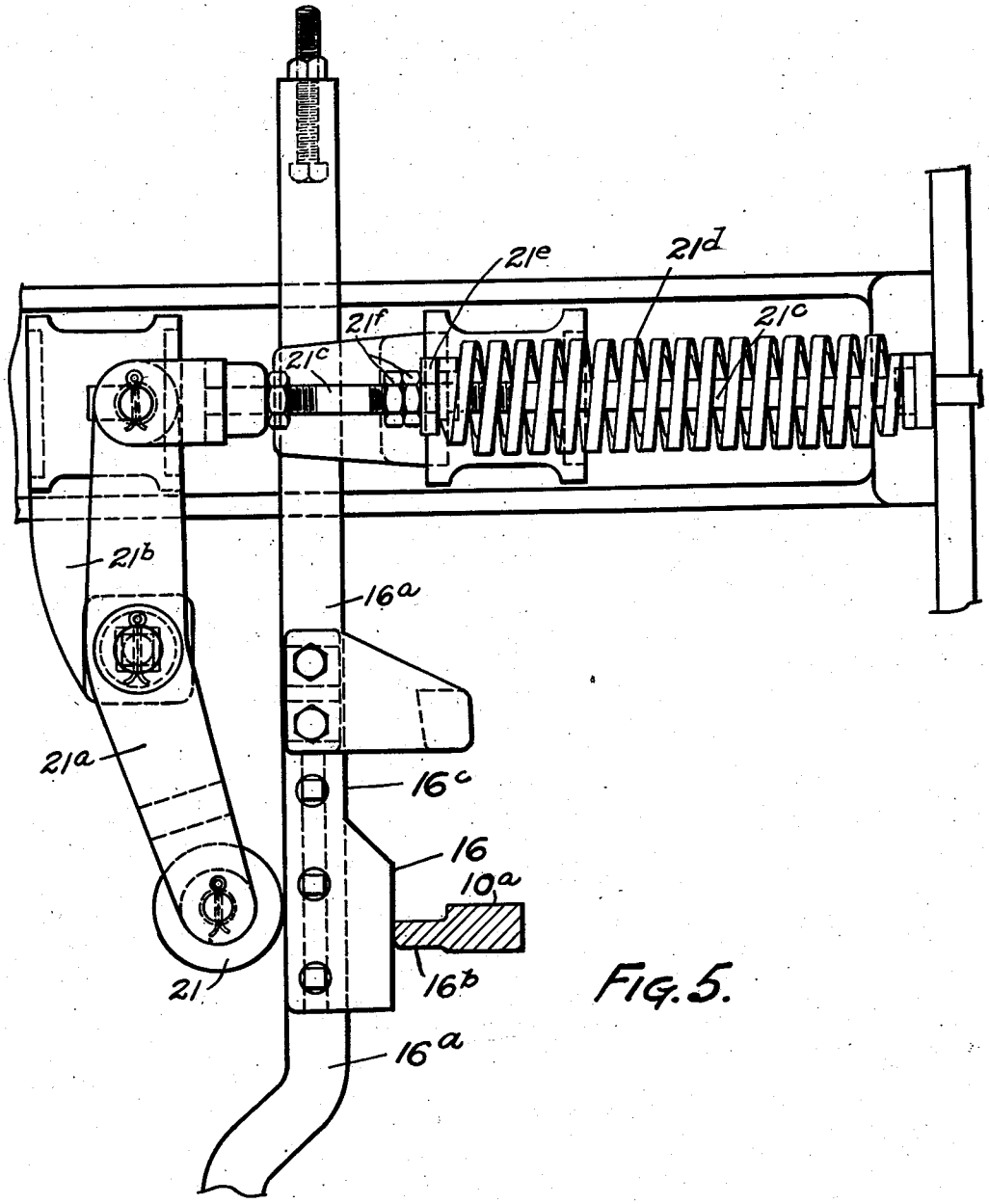


FIG. 5.

INVENTORS:
Edward Stanley Butler
Arthur Sutcliffe
BY THEIR ATTORNEYS:- Pennie, Edmonds, Morton, Barrows and Taylor

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Filed March 16, 1950 4 Sheets-Sheet 4

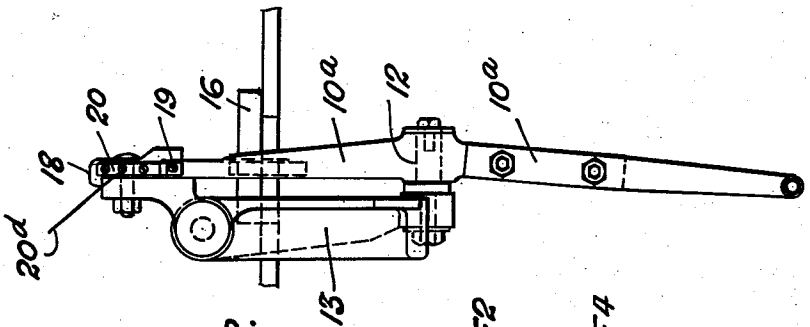


FIG. 2.

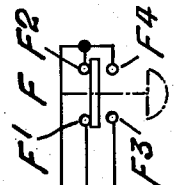


FIG. 6.

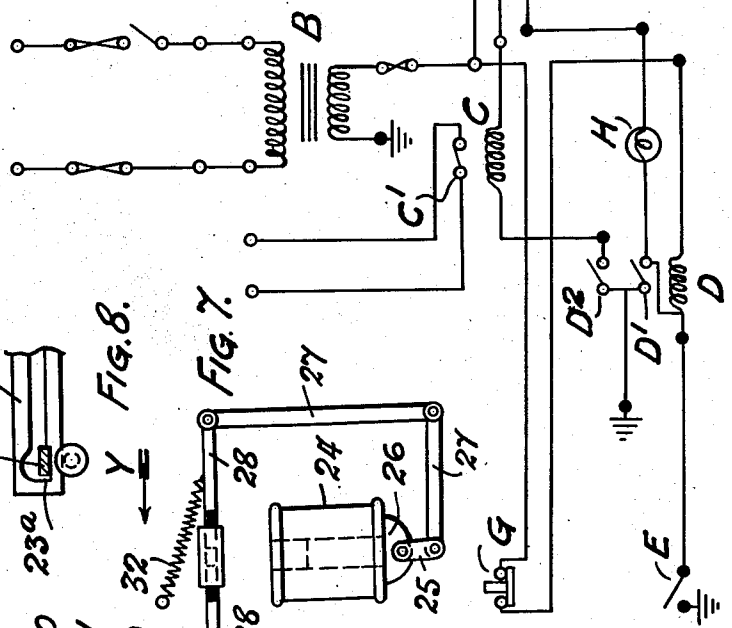


FIG. 7.

FIG. 8.

INVENTORS:
Edward Stanley Butler
Arthur Sutcliffe

BY THEIR ATTORNEYS:- Pennie, Edmonds, Morton, Barrows and Taylor

Patented Jan. 19, 1954 2,666,458

UNITED STATES PATENT OFFICE

2,666,458

SAFETY DEVICE FOR LOOMS FOR WEAVING TUFTED PILE FABRICS

Edward S. Butler, Chadderton, Oldham, and Arthur Sutcliffe, Werneth, Oldham, England, assignors to Platt Brothers and Company Limited, Oldham, England

Application March 16, 1950, Serial No. 150,094

Claims priority, application Great Britain March 19, 1949

3 Claims. (Cl. 139—336)

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This invention relating to safety devices for looms for weaving tufted pile fabrics refers to spool Axminster carpet looms and more particularly to the transferring mechanism by which tube frames carrying spools of tuft yarn to be inserted between warp threads are disengaged from the carrying chains and carried to the place where the tube frames are caused to insert tuft yarn between the warp threads and are subsequently restored to the carrying chains.

The present invention has for its object the provision of means for preventing the loom from being run when there is not a tube frame in the transferring arms, i. e., when for any reason the tube frame is not in correct position to be taken from the chains or has subsequently fallen from the clasping mechanism.

The invention provides tube frame transferring mechanism for looms for weaving tufted pile fabric in which one of the transferring arms forms one contact terminal in a low-voltage electrical circuit of electric stop motion means, the other contact of which is provided on an insulated bracket on the transferring shaft and comprises a metal plate insulated from said bracket and furnished with an adjustable screw terminal projecting into the path of movement of the adjacent transferring arm whereby when the said screw terminal is contacted by said transferring arm the low-voltage circuit is completed and the electric stop motion is brought into action to stop the loom or to prevent the loom from being run when there is not a tube frame in the transferring arms.

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

Referring to the drawings Fig. 1 is a plan of the transferring mechanism of a spool Axminster carpet loom embodying the invention; Fig. 1*a* is a fragmentary sectional view through the line X—X of Fig. 1; Fig. 2 is a sectional side view through the line II—II of Fig. 1; Fig. 3 is a fragmentary plan and Fig. 4 a fragmentary side view of the left-hand upper part of Fig. 1, drawn to a larger scale and showing an electrical contact plate later to be described; Fig. 5 is a fragmentary view drawn to a larger scale of the clasping cam mechanism; Fig. 6 is a diagram of the electrical circuit of the electric stop motion; Figs. 7 and 8 are diagrammatic views of a detail part later to be described.

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

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Referring to the drawings 10ª, 10ᵇ indicate a pair of transferring arms each carrying at its forward extremity a clasping bracket 11 for engaging a tube frame T and each pivoted approximately midway of their length on a pivot stud 12 carried in a bracket 13 integral with a transferring shaft 14 extending across the full width of the loom and carried at opposite ends in bearing brackets, not shown, secured to the loom frame.

Each pair of transferring arms is inter-connected by a linkage 15 in such a manner that the transferring arms may be caused to move towards or away from one another when one of the transferring arms, i. e. 10ª is moved by a vertically disposed cam 16 in the working of the loom, in known manner.

The means by which the clasping rod cam 16, on a rod 16ª, is maintained against the arm 10ª is shown in Fig. 5 in which 21 indicates a bowl or roller mounted at one end of a lever 21ª pivoted in a bracket 21ᵇ on the loom frame. Connected to the opposite end of the lever 21ª is a rod 21ᶜ slidably supported at its opposite end in a part of the loom frame. Strung on the rod 21ᶜ is a compression spring 21ᵈ acting between the loom frame and a block 21ᵉ mounted on the rod 21ᶜ and adjustable in position by lock nuts 21ᶠ screwed on a screw-threaded part of the rod 21ᶜ whereby the bowl 21 is held against the operating rod 16ª.

The transferring arm 10ª is maintained with its rear extremity in contact with the cam 16 by a tension spring 17, and opposing force is applied to the cam 16 by the compression spring 21ᵈ through the lever 21ª and bowl 21. The load imposed on the ends of the tube frames by the clasps 11 at the forward ends of the transferring arms may be regulated by adjusting the link motion 15 as desired.

A projection or bracket 18 forming part of the transferring shaft 14 is furnished adjacent to its rear with an electrical contact terminal, the terminal being insulated from the loom.

The contact terminal is in the form of an adjustable screw 19 mounted in a plate 20 secured to, but insulated from the bracket 18.

The plate 20 is secured to the bracket 18 by screws 20ª passing through insulating bushes 20ᵇ fitted into the plate 20, a piece of insulating material 20ᶜ being inserted between the plate 20 and the bracket 18, as shown in Fig. 3. The electric lead to the plate 20 is indicated at 20ᵈ.

The terminal is in a low voltage electrical circuit embodying a relay in connection with the starter of the electro-motor.

The insulated terminal 19 forms one contact while the other contact is formed by the transferring arm 10a.

When a tube frame is properly held in the clasps 11 at the forward end of the transferring arms the electrical contact 19 cannot be engaged by the arm 10a and the loom continues to run.

When a tube frame is transferred from the transferring arms to the carrier chains the forward ends of arms 10a and 10b are moved outwardly in opposite directions about their respective pivots 12 and during the time taken by the carrying chains to move from one position to the next position to bring a fresh tube frame into position for removal the contact 19 remains unengaged by arm 10a and the loom continues to run.

The aforesaid outward movement of the transferring arms is brought about by known mechanism shown in Figs. 1 and 5, in which the clasping rod cam 16, secured to the rod 16a, bears against a projection 16b on the rearward portion of the transferring arm 10a. When the aforementioned parts are in the positions shown in Fig. 5, the clasping means 11 are in the positions shown in Fig. 1, i. e., in the positions where they are holding the tube frame T.

When it is desired to unclasp the tube frame T the rod 16a is moved downwardly (as viewed in Fig. 5) so that the projection 16b on the rearward end of the transferring arm 10a is moved into contact with the part 16c under the influence of the spring 17. This has the effect of bringing the rearward portions of the transferring arms towards each other, thereby moving the clasping means 11 outwardly.

The spring 21d, as shown in Fig. 5, exerts a constant pressure on the rearward end of the transferring arm 10a which tends to force the clasping means 11 inwardly. When the several parts of the mechanism are in the positions shown in Figs. 1 and 5, the pressure of the spring 21d is resisted by the tube frame T and the portion 10' of arm 10a is held away from the aforesaid electrical contact 19. But if the tube frame T is not in the correct position to be received by the clasping means 11, or if it should fall from the said means, the spring 21d acts to move the rearward portion 10' of the transferring arm 10a through an additional distance that is sufficient to cause the rearward portion 10' of the arm 10a to come into abutment with the contact terminal 19, see chain dotted lines in Fig. 3, to close the said low voltage electrical circuit and bring the stop motion means into operation.

The sequence of operations of the electric stop motion will be described with reference to the diagram shown in Fig. 6 in which B indicates a transformer for low 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 provided by the screw terminal 19 and the transferring arm 10a; 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, the transferring arms being in the position shown in Fig. 1.

When the transferring arms move towards each other, contact is made between the terminal 19 and the adjacent transferring arm 10a thereby making contact at E (Fig. 6) and thus energising the relay coil D and closing contacts D^1, D^2, contact D^1 providing an alternate 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 de-energises a solenoid on the loom, whereby to trip the starting handle.

The starting handle, which is spring-loaded, thus returns to the "off" position and in so doing releases the clutch between the electromotor and the loom and applies a mechanical brake, 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 cause 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.

The means for moving the starting handle quickly from "on" position to "off" position are shown diagrammatically in Figs. 7 and 8.

Referring to Figs. 7 and 8, 22 indicates the starting handle shown in the "on" position in a notch 23a in a quadrant 23, see Fig. 8. 24 indicates a solenoid carried in suitable position on the loom; connected by a swivel 25 to the core 26 of the solenoid 24 is a bell-crank lever 27, the opposite end of which is connected to an adjustable connecting rod 28. The connecting rod 28 is connected at its opposite end by a lever 29 to a knock-off lever 30 pivoted on the same shaft 31 as the lever 29, the free end of the knock-off lever 30 lying adjacent to the starting handle 22 when in the "on" position. When the stop motion is actuated as previously described, the solenoid 24 is de-energised, whereupon the core 26 drops and through the link 25 rocks the bell-crank lever 27 which in turn pushes the connecting rod in the direction of the arrow Y to rock the lever 29 and with it the knock-off lever 30 which, moving quickly forward under the influence of a spring 32 in operative association with the connecting rod 28, knocks the starting handle 22 out of the notch 23a.

The starting handle 22 which is spring-influenced moves rapidly to the "off" position and releases the driving clutch between the electromotor and the loom and applies a brake to bring the loom to a standstill.

What we claim is:

1. In spool Axminster carpet looms embodying an electromotor, a clutch, a starting handle, a brake, electric stop motion means embodying a low-voltage circuit, transferring mechanism for tube frames of the loom embodying a pair of transferring arms mounted on a transferring shaft, clasping means attached to the forward ends of said transferring arms and spring means for urging the forward ends of the transferring arms towards each other when there is not a

tube frame in the clamping means, an electric stop motion means for the loom including a low voltage electric circuit having a pair of contact terminals, one of said transferring arms forming one of said contact terminals in the low-voltage electrical circuit of said electric stop motion means, the other contact terminal of which is carried on a bracket on the transferring shaft and comprises a metal plate, an insulation block interposed between said plate and said bracket, screws screwing through insulation bushes in said metal plate to secure the plate to the bracket and an adjustable screw terminal on said plate projecting into the path of movement of said one transferring arm forming one of said contact terminals, whereby when said transferring arm contacts with said screw terminal the low-voltage circuit is energized and the electric stop motion means is brought into action to stop the loom or to prevent the loom from being run when there is not a tube frame in the transferring arms.

2. Mechanism as claimed in claim 1, in which the electric stop motion means embodying a low-voltage electric circuit 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 re-set button on the loom and a signal lamp.

3. In spool Axminster carpet looms embodying an electromotor, a clutch, a starting handle, a brake, electric stop motion means embodying a low-voltage circuit, transferring mechanism for tube frames of the loom embodying a pair of

transferring arms mounted on a transferring shaft, clasping means attached to the forward ends of said transferring arms and spring means for urging the forward ends of the transferring arms towards each other when there is not a tube frame in the clasping means, the improvement comprising an electric stop motion means for the loom including a low-voltage electric circuit having a pair of contact terminals adapted to be energized for putting the stop motion means into operation, one of said transferring arms forming one of said contact terminals in the low-voltage electric circuit of the stop motion means, the other contact terminal of said circuit being carried on the loom and insulated therefrom, said other contact terminal being located in the path of movement of said one transferring arm forming one of said contact terminals when a tube frame is not in the clasping means of the arms, whereby said one transferring arm is adapted to engage said other contact terminal and energize the low-voltage electrical circuit to stop the loom when there is not a tube frame in the clasping means of the transferring arms.

E. S. BUTLER.
ARTHUR SUTCLIFFE.

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