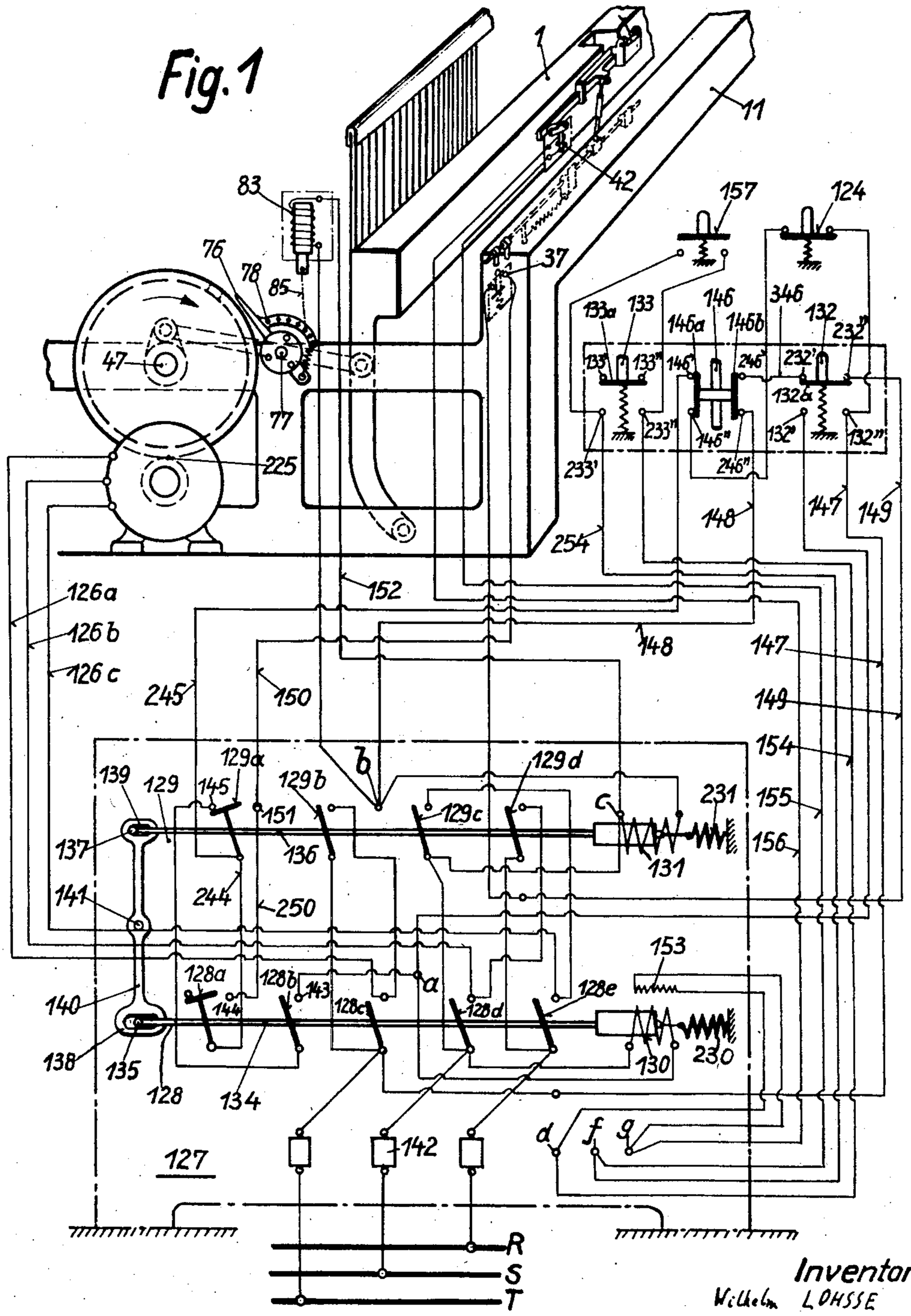
Feb. 28, 1939. W. LOHSSE 2,148,700

MECHANISM FOR STOPPING ELECTRICALLY DRIVEN LOOMS

Filed Aug. 6, 1938 4 Sheets-Sheet 1

Fig. 1



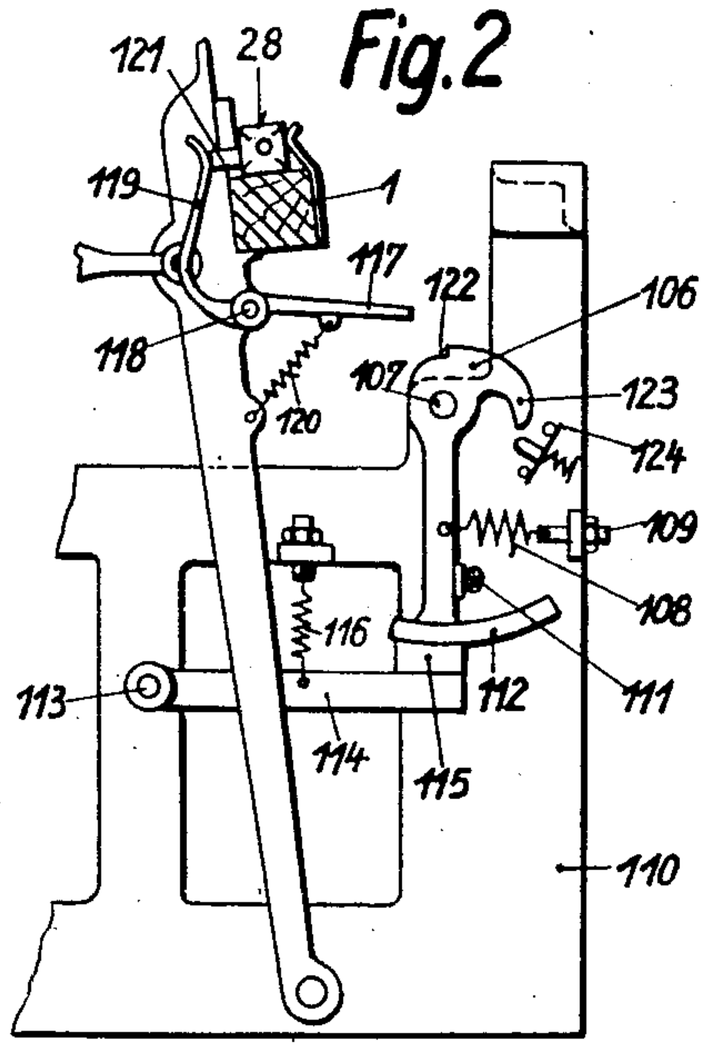
Inventor:
Wilhelm LOHSSE
by K. W. Feist
his Attorney

Feb. 28, 1939. W. LOHSSE 2,148,700

MECHANISM FOR STOPPING ELECTRICALLY DRIVEN LOOMS

Filed Aug. 6, 1938 4 Sheets-Sheet 2

Fig.2



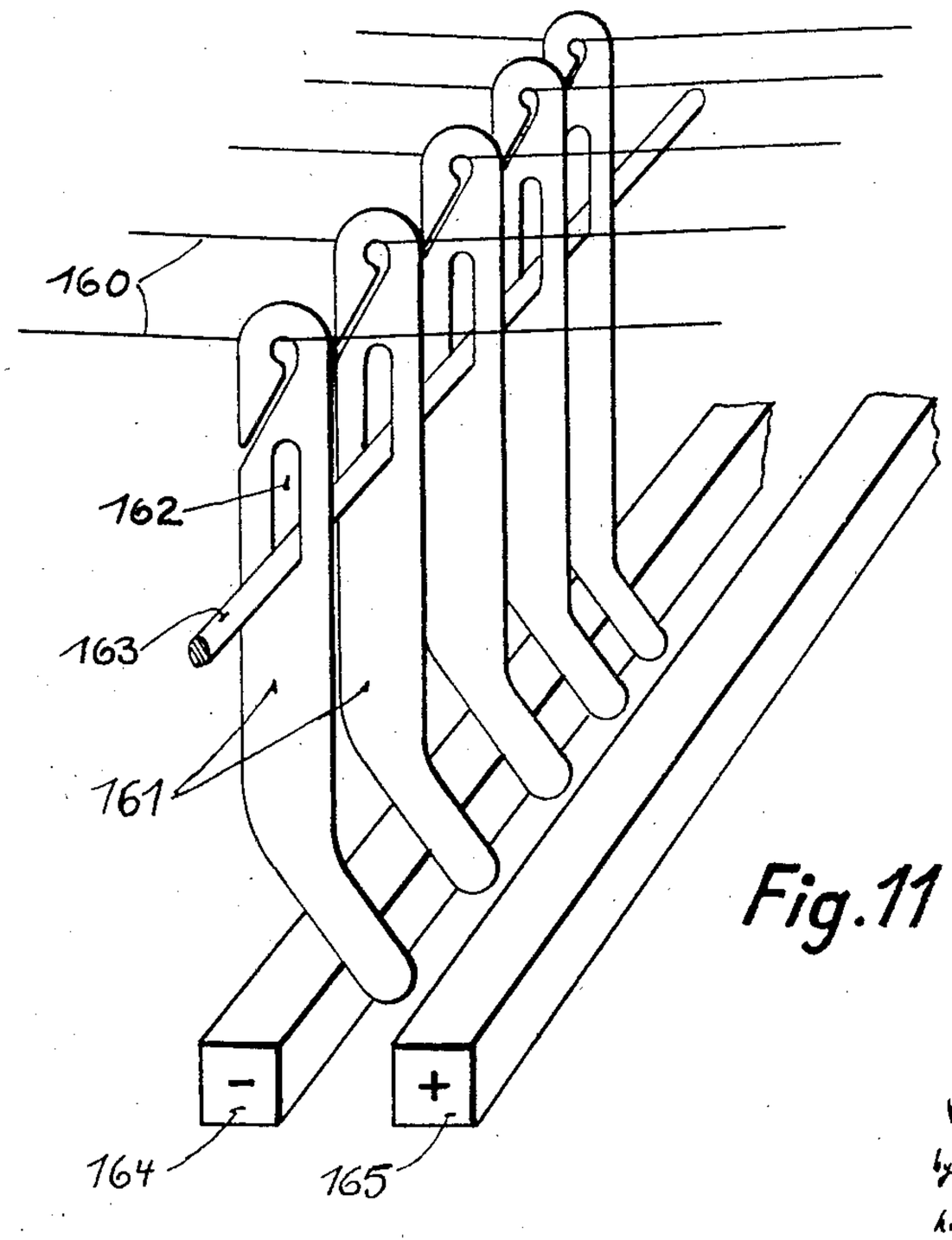


Fig.11

Inventor:
Wilhelm LOHSSE
by V. W. Feist
his Attorney

Feb. 28, 1939. W. LOHSSE 2,148,700

MECHANISM FOR STOPPING ELECTRICALLY DRIVEN LOOMS

Filed Aug. 6, 1938 4 Sheets-Sheet 3

Fig. 3

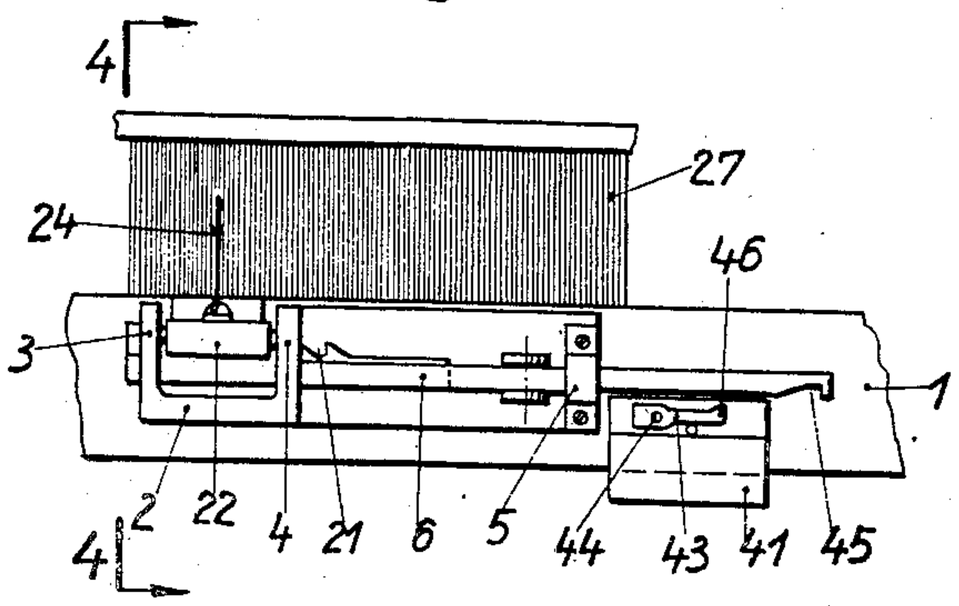


Fig. 4

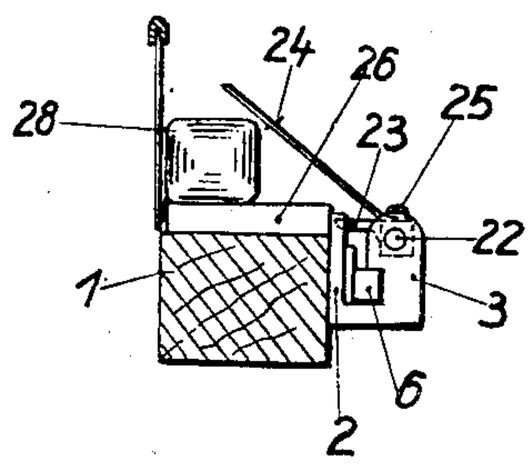


Fig. 5

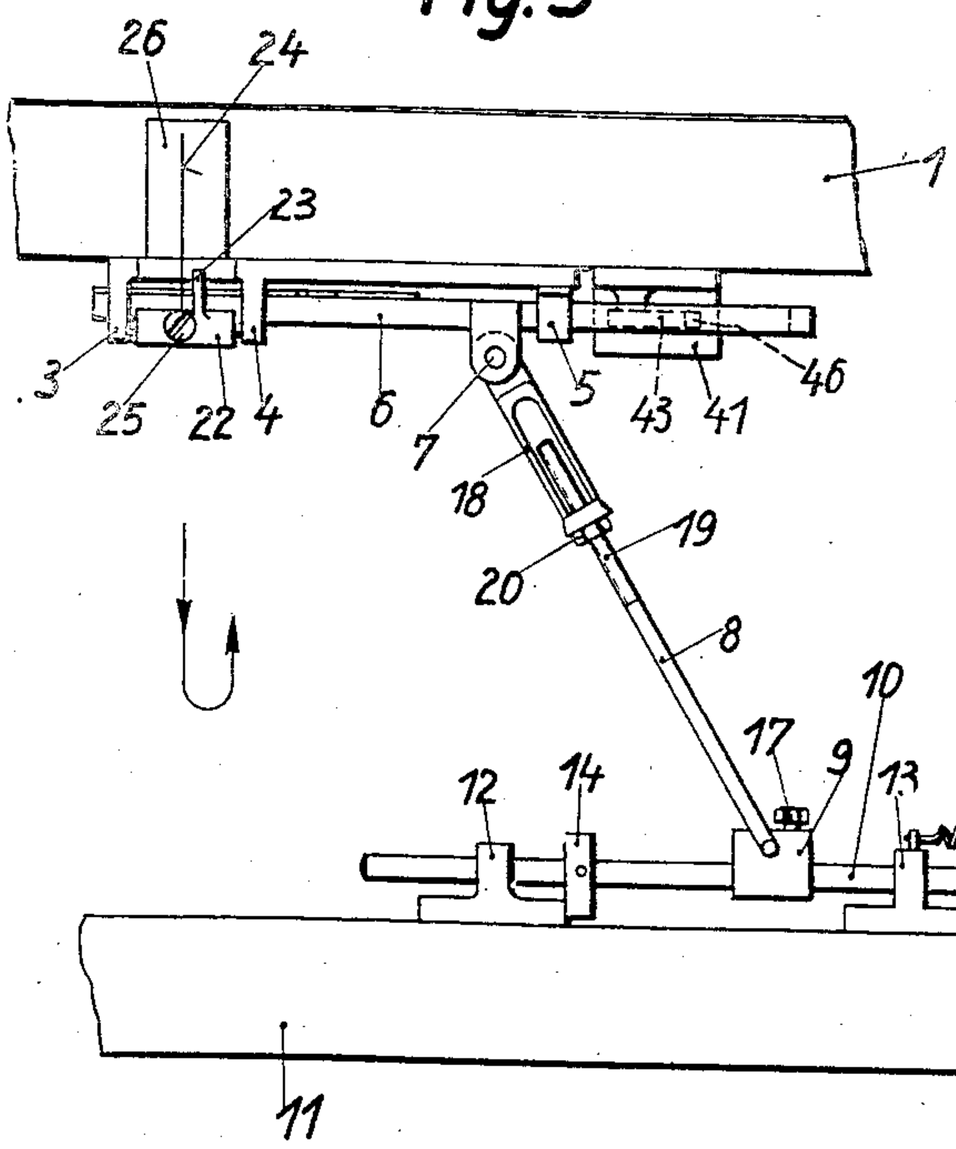
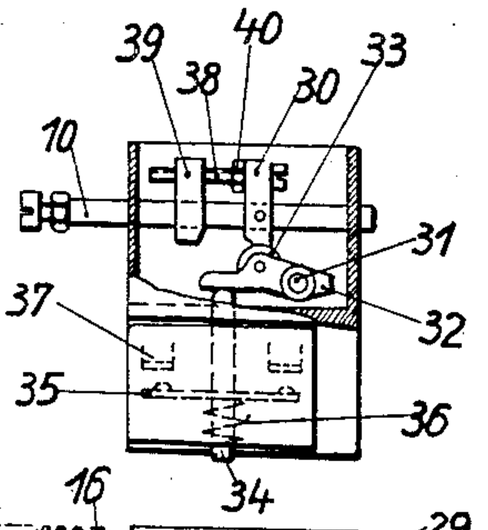


Fig. 6



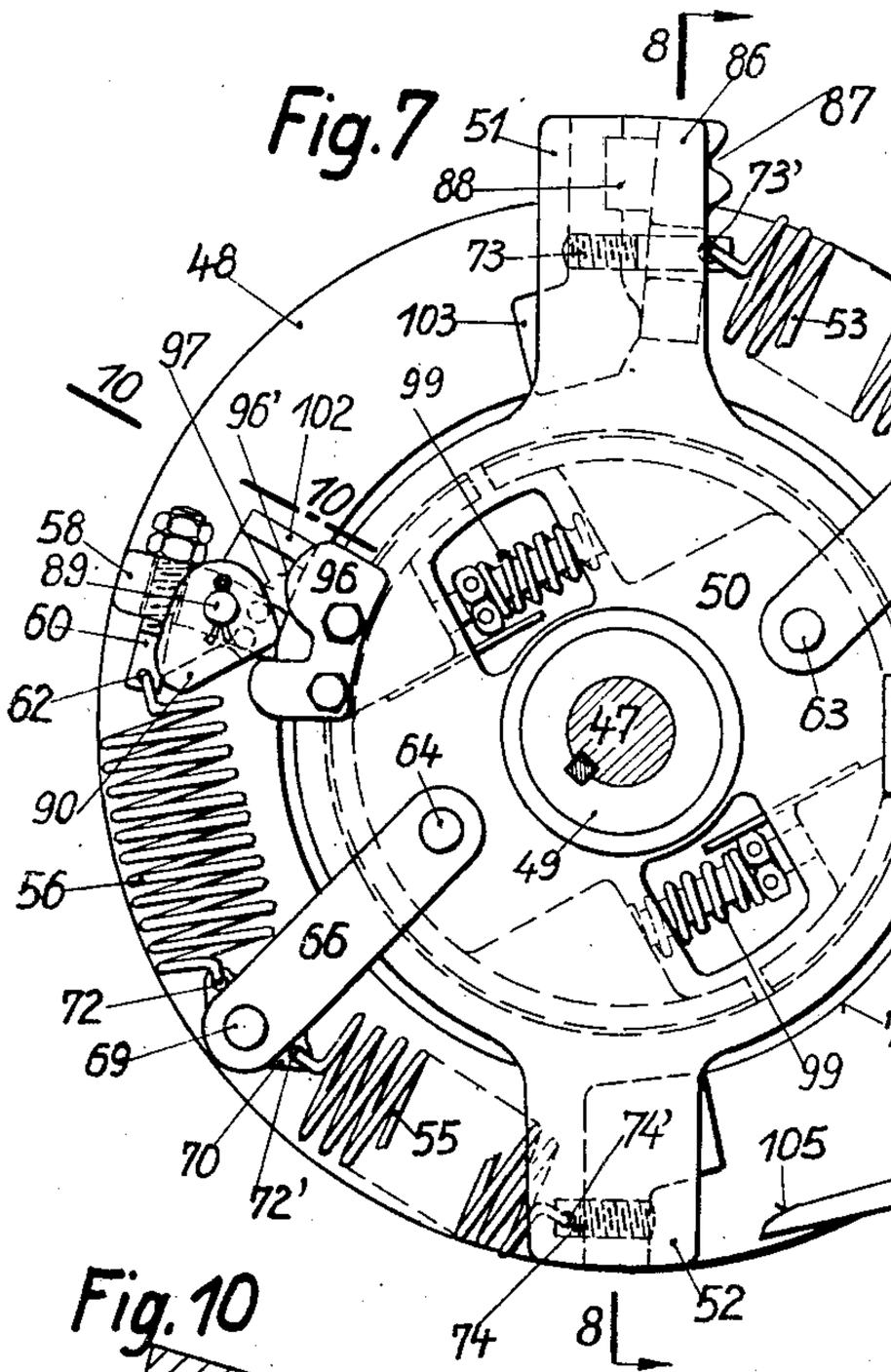
Inventor:
Wilhelm LOHSSE
by [illegible] Freist
his Attorney

Feb. 28, 1939. W. LOHSSE 2,148,700

MECHANISM FOR STOPPING ELECTRICALLY DRIVEN LOOMS

Filed Aug. 6, 1938 4 Sheets-Sheet 4

Fig.7



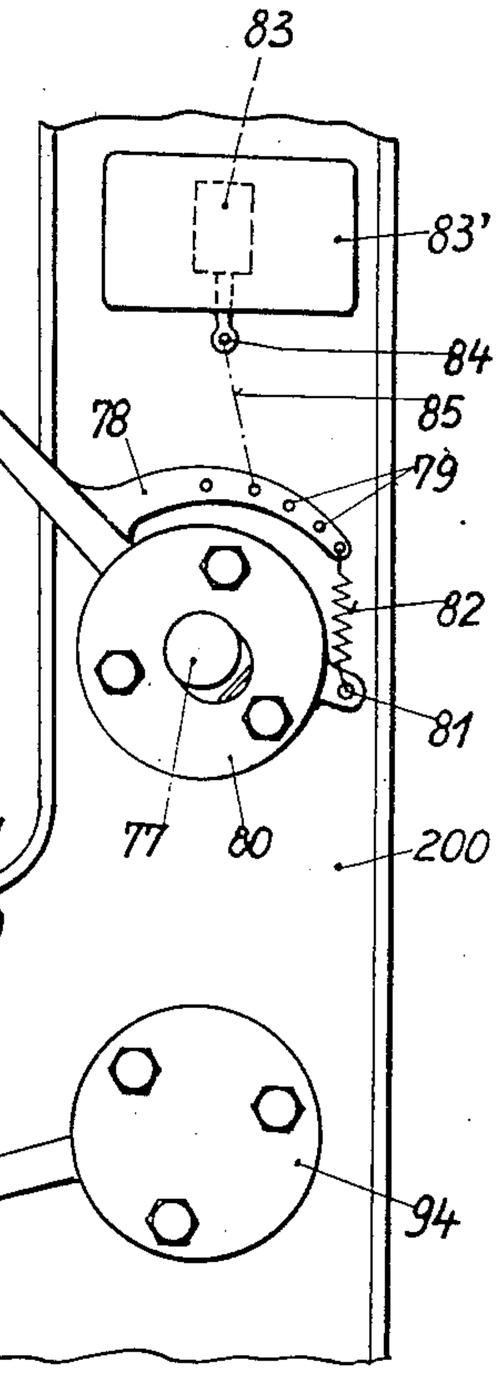


Fig.10

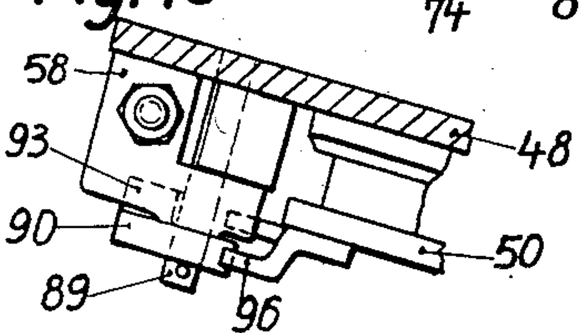


Fig.9

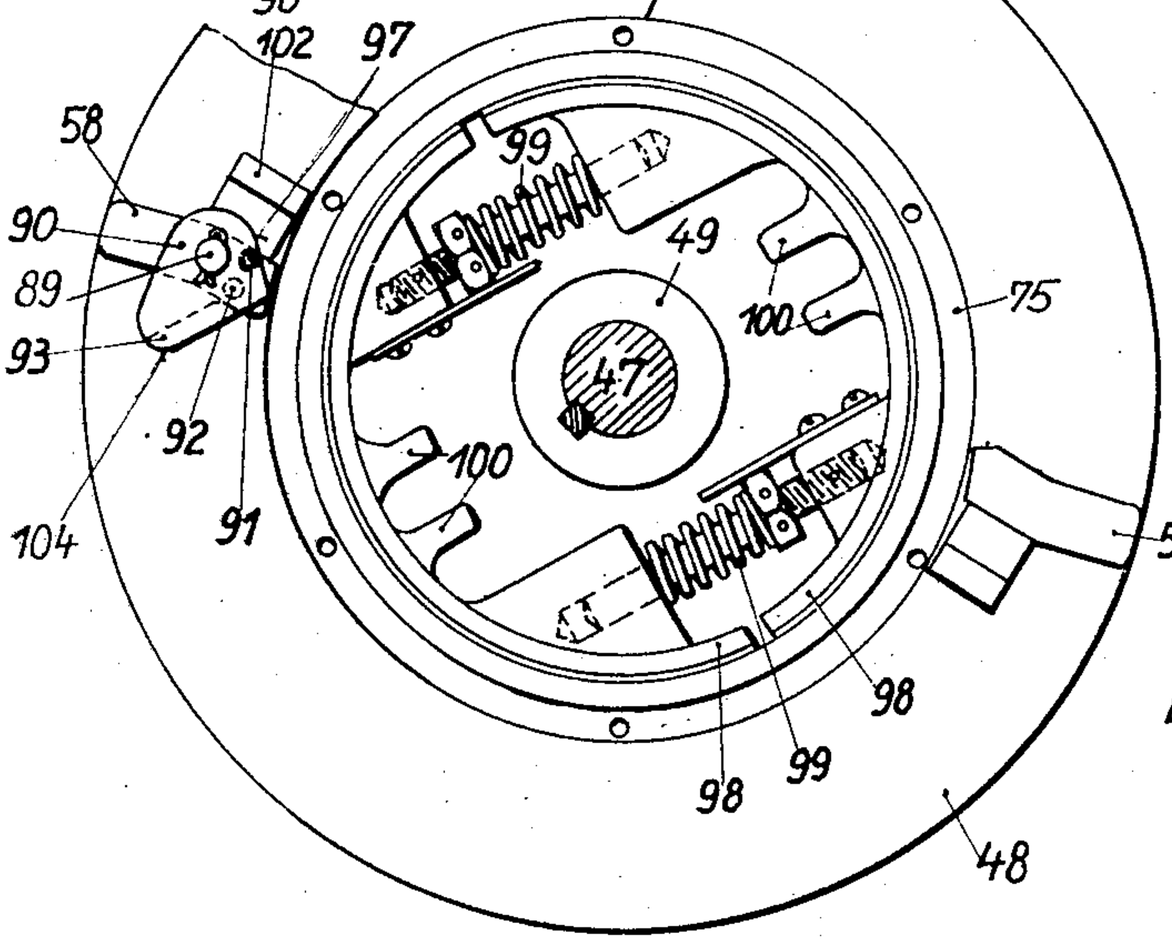
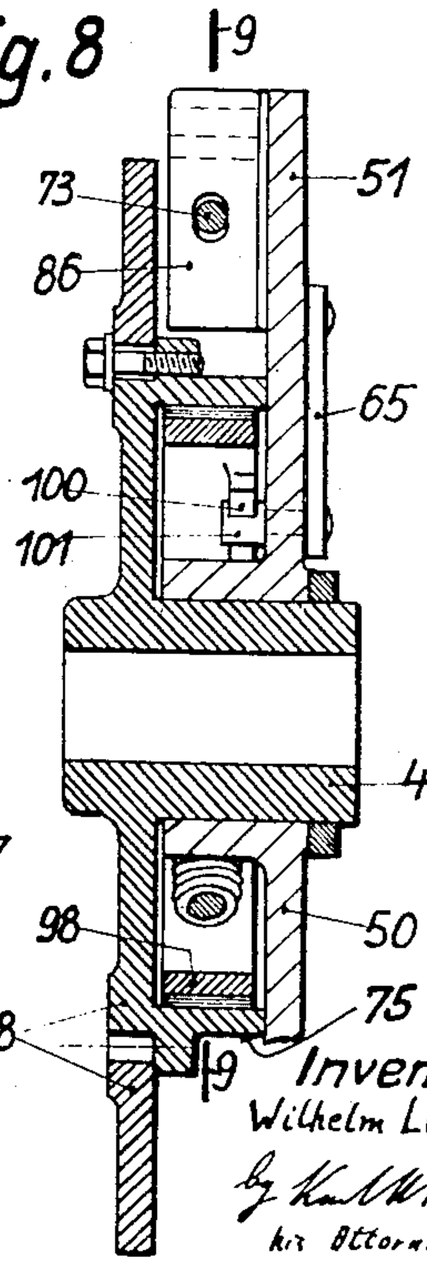


Fig.8



Inventor:
Wilhelm LOHSSE
by Karl W. Freist
his Attorney

Patented Feb. 28, 1939

2,148,700

UNITED STATES PATENT OFFICE

2,148,700

MECHANISM FOR STOPPING ELECTRICALLY DRIVEN LOOMS

Wilhelm Lohsse, Gladbach-Rheydt, Germany, assignor to Schorch Werke A. G., Rheydt-Rhineland, Germany

Application August 6, 1938, Serial No. 223,513
In Germany January 31, 1936

13 Claims. (Cl. 139—336)

My invention relates to improvement in looms, and more particularly to a mechanism for stopping electrically driven looms in a predetermined position in case of a disturbance.

As is well known, there are various kinds of disturbances or interruptions of service which may occur during the operation of a loom. For example, the weft thread or one of the warp threads may break, the shuttle bobbin may become empty or the flying shuttle may fail to reach the shuttle box and becomes trapped in the shed, whereby a so-called shed breakage resulting also in a breakage of the warp threads may be caused.

One of the objects of my invention is to provide a mechanism, which after the occurrence of any disturbance or interruption of service, automatically arrests an electrically driven loom in a predetermined position in which the loom slay always occupies its rear position.

Another object of my invention consists in the provision of means, which after the occurrence of a disturbance, prevent the loom slay from reaching its front position in which it is nearest to the breast beam. Therefore, in case of a disturbance, it is necessary to brake the loom to such an extent, that the loom is already arrested before the loom slay reaches its front point of reversal. Automatic devices then must return the loom slay to its furthest rear position, whereupon the loom is positively stopped.

Still another object of the invention is to provide means, which during the stopping of the loom, electrically brake the driving motor by means of reverse current and at the same time render operative a resilient buffer brake by tensioning the springs thereof, whereupon the loom slay is returned into its furthest rear position by the force inherent in said springs brought under tension.

A further object of my invention is to provide an additional friction brake which aids the active arresting of the loom and which also serves to consume the excess energy of the buffer springs being under tension, if the loom slay is returned.

Another object of my invention is to provide an electrical remote control for the above mentioned different types of brakes and furthermore to time the braking operation by reverse current in such a way by means of said electrical remote control and by means of the well known control of the weft thread guard, that the reverse current braking is operative only during the active arresting of the loom.

Still another object of my invention is to provide a hand release, by means of which the arresting of the loom may be carried out in exactly the same manner as takes place by means of the electrical remote control after the occurrence of a disturbance.

Furthermore, it is an object of my invention to provide an electrical remote control, by means of which the arbitrary starting and stopping of the motor by hand, either to begin or to end a normal operation of the loom or to cause short movements of the loom slay, may be obtained, and to combine this remote control with the above mentioned remote control for the arresting operation.

Still another object of my invention is to provide means, which through the electrical remote control prevent the weft thread guard from acting until the first pick or shot has occurred.

The above objects, as well as others not particularly pointed out, will appear from the following description with reference to the accompanying drawings in which like reference characters in the several figures denote like parts and in which

Fig. 1 is a diagrammatical illustration of my new driving and arresting mechanism of an electrically driven loom,

Fig. 2 shows an additional device adapted to release the arresting means in order to avoid a shed breakage,

Fig. 3 is a front view of a part of the loom slay with the weft thread guard and the device controlling the latter mounted thereon,

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3,

Fig. 5 is a top plan view of the loom slay, the breast beam and the weft thread guard control,

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5,

Fig. 7 is an elevational view of the combined buffer and friction brake,

Fig. 8 is a sectional view taken on line 8—8 of Fig. 7,

Fig. 9 is a fragmental sectional view taken on line 9—9 of Fig. 8, and

Fig. 10 is a sectional view taken on line 10—10 of Fig. 7.

Fig. 11 shows diagrammatically a warp thread guard controlling an electric contact.

Referring to Figs. 1, 3, 4 and 5, 1 indicates the loom slay. A plate 2 is attached to the inner side of said loom slay and is provided with lugs 3, 4 and 5, in which a bar 6 is slidably arranged. 11 indicates the breast beam provided with lugs 12 and 13, in which a bar 10 consisting of two

parts is slidably arranged. A member 9 is adjustably arranged on the bar 10 and may be fixed in a predetermined position by means of a screw 17. An adjusting collar 14 mounted on the bar 10 prevents a left-hand movement of the latter, and a spring 15, one end of which being secured to the lug 13 the other end thereof being secured to a pin 16 attached to the bar 10, tends to prevent a right-hand movement of the bar 10. A rod 8 provided with a threaded portion 19 and a sleeve 18 threaded thereon form a link, which connects the bar 6 with the bar 10. At 7, the free end of the sleeve 18 is pivoted to a projecting part of the bar 6, while the free end of the rod 8 is pivoted to the member 9 adjustably arranged on the bar 10. A lock nut 20 secures the position of the rod 8 and the sleeve 18 with respect to each other.

The bar 6 has a recess 21. A shaft 22 provided with a projecting lever 23 is journalled in the lugs 3 and 4. Furthermore, a weft needle 24 is secured to the shaft 22 by means of a screw 25. Opposite the weft needle 24, the loom slay 1 is provided with a recess 26, into which the weft needle 24 may fall. 27 indicates a reed and 28 indicates the flying shuttle.

The above described device represents a normal weft thread guard, which operates as follows:

During the operation of the loom, the loom slay 1 reciprocates to and from the breast beam 11. As long as no disturbance occurs, i. e. as long as neither the weft thread breaks nor the shuttle bobbin becomes empty, the bar 10 and the member 9 remain in their normal position, as the spring 15 counteracts a displacement of the bar 10 to the right hand. The bar 6, however, is shifted along the loom slay 1, i. e. if the loom slay approaches the breast beam, the bar 6 is moved to the left hand, and if the loom slay leaves the breast beam, the bar 6 is moved to the right hand.

The weft needle 24 rests on the thread during each shot and retains the lever in a level above the recess 21, so that the bar 6 may reciprocate along the loom slay. If, however, due to a breakage of the weft thread, the weft needle has no thread to rest on, the needle falls downwardly and the lever 23 engages with the recess 21, as soon as the latter is moved below the lever 23. This engagement between the lever 23 and the recess 21 occurs at the particular moment, when the loom slay has covered about half of its distance from its furthest rear position to the breast beam, so that from now on the bar 6 is locked with respect to the loom slay 1 and the continuation of the movement of the loom slay towards the breast beam causes a movement of the bar 10 to the right hand by means of the link 18, 8 against the action of the spring 15. This movement of the bar 10 to the right hand is used to start the stopping operation as will be explained hereinafter.

Referring to Fig. 5, the bar 10 extends through the casing 29. An adjusting collar 30 is mounted on the bar 10 within said casing 29, as shown in Fig. 6. A lever 32 carrying a roller 33 is pivoted to the casing 29 at 31. In the normal position of the bar 10, the roller 33 rests on the adjusting collar 30 and presses the left-hand end of the lever 32 against the upper end of a pin 34 carrying a contact bridge 35, so that the bridge 35 is removed from the stationary terminals 37 against the action of a spring 36 arranged between the bridge 35 and the wall of the casing 29 and the switch is in its open position. A screw 38 passes through a hole of the adjusting collar 30 and is arranged in a direction parallel to the bar 10. A lock nut 40 prevents an undesired rotation of the screw 38. A second adjusting collar 39 provided with a threaded hole is threaded on the screw 38 at a distance from the first adjusting collar 30. The distance between said two collars may be changed by a rotation of the screw 38.

If due to a disturbance the bar 10 is shifted to the right hand as mentioned above, the collar 30 disengages from the roller 33, so that the spring 36 moves the contact bridge 35 upwardly against the terminals 37 and the switch is closed. Together with the bridge, the pin 34 and the left-hand end of the lever 32 are moved upwardly. If the bar 10 is moved further to the right hand, the collar 39 engages with the roller 33 and presses the pin 34 with its bridge 35 downwardly, so that the switch is opened again. Therefore, the switch is closed only for the time during which the bar 10 is moved for the distance between said two collars 30 and 39.

As will be explained hereinafter, the closing of the switch 35, 37 causes the braking of the electrical driving motor by reverse current and at the same time excites a buffer and friction brake.

As shown in Figs. 3 and 5, a casing 41 is attached to the loom slay 1 below the right-hand end of the bar 6. A pawl 43 arranged in said casing may swing about a pivot 44. Furthermore, an electro-magnet 42 shown in Fig. 1 is arranged in said casing, and its armature is connected to said pawl 43. During the normal operation of the loom, the nose 46 of the pawl 43 is outside of the path of the bar 6 which has a recess 45 at its right-hand end. If, however, the electro-magnet 42 is excited, the armature thereof swings the pawl 43 in a counter-clockwise direction, so that the nose 46 engages with said recess 45, if the bar 6 moves to the left hand and the recess 45 comes in alignment with the nose 46. The recesses 21 and 45 are arranged in such a way, that at the same time the recess 21 is below the lever 23 the recess 45 is above the nose 46. Therefore, the excitement of the electro-magnet 42 will have the same effect as the engagement of the lever 23 with the recess 21 after a downward falling of the weft needle 24. As soon as the nose 46 has been engaged with the recess 45, this engagement continues independent of the fact whether or not the electro-magnet is still excited, until the loom slay reverses its direction of movement after having reached the breast beam, whereby the bar 6 is moved to the right-hand and the recess 45 becomes disengaged from the nose 46.

Referring now to Fig. 7, 48 indicates a disk, which is keyed on the loom shaft 47. A second disk 50 is loosely arranged on the hub 49 of the first disk 48, so that said two disks may be rotated relatively to each other. The disk 48 has two lugs 57 and 58, the disk 50 has two lugs 51 and 52. Springs 53 and 54 are arranged between the lugs 51 and 57, springs 55 and 56 are arranged between the lugs 52 and 58 in the following manner: Screw bolts 59 and 60 provided with holes 61 and 62 respectively are secured to the lugs 57 and 58 of the disk 48. Furthermore links or levers 65 and 66 are swingably mounted on the disk 50 at 63 and 64 and carry pins 67 and 69. Flat connecting members 68 and 70 provided with holes 71, 71′ and 72, 72′ respectively are

rotatably mounted on said pins 67 and 69. Screw bolts 73 and 74 provided with holes 73' and 74' respectively are secured to the lugs 51 and 52 of the disk 50. The ends of the spring 53 are inserted in the holes 73' and 71', the ends of the spring 54 are inserted in the holes 71 and 61, the ends of the spring 55 are inserted in the holes 74' and 72' and the ends of the spring 56 are inserted in the holes 72 and 62. Thus, the springs 53 and 54 on the one hand, and the springs 55 and 56 on the other hand, are stretched between the disks 48 and 50, whereby the levers 65 and 66 keep the springs away from the flange 75 of the disk 48.

In the plane of the lug 51, a stop rod nib 76 is rotatably mounted on a pin 77 secured to the side wall of the loom. An arm 78 provided with a series of holes 79 is rigidly secured to the stop rod nib 76. A plate 80 secured to the side wall of the loom by means of screws has an eye 81. One end of a spring 82 is attached to said eye 81, the other end of the spring 82 is attached to one of said holes 79 of the arm 78. An electro-magnet 83 is placed in a casing 83' attached to the side-wall of the loom. The armature of this electro-magnet has a hole 84, and a chain 85 is arranged between said hole 84 and one of the holes 79 of the arm 78. A lever 86 having an indention 87 is arranged on the bolt 73 secured to the lug 51 of the disk 50. A rubber buffer 88 presses the lever 86 against the end of the spring 53 which is inserted into the hole 73' of the bolt 73.

If the braking electro-magnet 83 is excited, the armature thereof swings the stop rod nib 76 by means of the chain 85 and the arm 79 in a counterclockwise direction, so that the stop rod nib 76 comes into the path of the rotating lug 51. Thus, the stop rod nib 76 engages with the indention 87 and prevents the disk 50 from further rotation.

Referring to Figs. 7, 9 and 10, a pawl 90 is swingably arranged on a pin 89 secured to the disk 48. The swing movement of said pawl 90 is limited to a certain angle by means of two locking means 91 and 92, which in a preferred embodiment have the form of a ball cooperating with indentions, so that the pawl 90, if slightly pushed either by the projection 96' of a plate 96 secured to the disk 50 or by a stop rod nib 95 described hereinafter, may easily swing from one end position into the other end position. In the position shown in Fig. 9, the locking means 91 is effective, if, however, the pawl 90 is swung through the possible angle, the other locking means 92 becomes effective and furthermore a projection or lug 93 of the pawl 90 abuts against the lug 58 of the disk 48. The lug 58 prevents a rotation of the pawl 90 in a clockwise direction, while the locking means 92 prevents a rotation of the pawl in a counter-clockwise direction.

The second stop rod nib 95 is rigidly arranged on a plate 94 screwed on the side wall 200, as shown in Fig. 7. This stop rod nib 95 is in the plane of the pawl 90, but is outside of the path thereof, if the pawl 90 rotating with the rotating disk 48 is in the position relative to the latter as shown in Fig. 7. If, however, the stop rod nib 76 stops the disk 50 in the above described manner and the non-arrested disk 48 moves relatively to the disk 50, the edge 97 of the pawl 90 rotating with the rotating disk engages with the projection 96' of the plate 96, whereby the pawl 90 is swung about its pivot 89 in a clock-wise direction and is brought into the end position, in which the other locking means 92 becomes effective. Then, the stop rod nib 95 is in the path of the pawl 90, if at a later interval the movement of the disk 48 is reversed in a counterclockwise direction as will be described hereinafter.

Referring now to Figs. 9 and 10, brake shoes 98 are disposed within the casing formed by the above mentioned flange 75 of the disk 48 and are pressed against said flange 75 by means of springs 99. The brake shoes 98 are provided with lugs 100 forming a catch for pins 101 secured to the disk 50. Thus, if the disks 50 and 48 are rotated relatively to each other, the pins 101 tend to rotate the brake shoes 98 relatively to the flange 75 of the disk 48 by means of the lugs or catches 100, whereby a braking effect is obtained.

The lug 58 of the disk 48 has an extension or stop 102 as shown in Figs. 7 and 9, which during a relative movement of the two disks 48 and 50 with respect to each other may engage with an abutment 103 attached to the disk 50.

The operation of the combined buffer and friction brakes is as follows:

During the operation of the loom the shaft 47 rotates in a clock-wise direction, whereby the disk 48 keyed on the shaft 47 and the disk 50 loosely arranged on the hub 49 of the disk 48 but connected with the disk 48 by springs are rotated in the same direction. As soon as a disturbance occurs, the electro-magnet 83 is excited in a manner explained hereinafter. The excited electro-magnet swings the stop rod nib 76 into the path of the indention 87, so that the latter engages with the stop rod nib 76 to cause an arresting of the disk 50. The disk 48, however, continues its rotation under the influence of the kinetic energy inherent in the moved masses, so that the springs 53, 54, 55, 56 are stretched due to the relative movement between the disks 48 and 50. The rotation of the disk 48 is continued until the stop 102 abuts against the abutment 103 or the kinetic energy of the moved masses of the loom is consumed by the braking effect of the brake shoes 98 cooperating with the flange 75 of the disk 48. During this period, the driving electro-motor is switched to reverse current by means of the above mentioned switch 37.

Shortly before the stop 102 abuts against the abutment 103, the driving electro-motor is entirely disconnected from the network as will be explained hereinafter in more detail during the description of the remote control. If the stop 102 engages with the abutment 103, the buffer springs are stretched. Then, the force inherent in the stretched springs becomes active and returns the disk 48 to such a degree, that the pawl 90, which during the above mentioned relative movement between the disks 48 and 50 passed the projection 96' of the plate 96 and has been swung by the latter into its effective position, abuts against the stop rod nib 95. This engagement of the pawl 90 with the stop rod nib 95 results in a positive arresting of the loom and takes place at the moment, when the loom slay is in its furthest rear position. If, after the removal of the disturbance, the driving electro-motor of the loom is restarted, the shaft 47 and disk 48 are rotated in a clock-wise direction, whereby shortly before finishing one rotation the curved edge 104 of the pawl 90 contacts with the inner edge 105 of the stop rod nib 95. This contact causes an impact, which returns the pawl 90 into its normal position shown in the figures, in which it is held by the locking means 91. As long as the pawl 90 remains in said normal position, the pawl does

not contact with the stop rod nib 95 during further rotations of the shaft 47 and disk 48.

The stop rod nib 95 is made of an elastic steel band and its edge 105 is somewhat inclined, so that in case of a too heavy recoil of the loom slay the stop rod nib is bent downwards and the curved edge 104 of the pawl passes along the inclined edge 105 of the stop rod nib thereby producing a certain braking effect.

As mentioned above, the movement of the disk 48 relatively to the disk 50 also causes the friction brake 98 to act. The friction brake is effective during the braking operation proper for stopping the loom as well as during the return of the loom slay into its furthest rear position.

Thus, the active braking operation is obtained by combining the resulting effects of the braking by reverse current, the buffer brake and the friction brake. This combined action of the three different kinds of braking permits a safe and positive control of the extraordinarily short braking path determined by the distance between the stops 102 and 103, so that it is possible to arrest the loom slay before it reaches its furthermost position. Due to the electrical braking by reverse current, the hitherto usual disengageable clutch between the motor and the loom may be omitted.

If the loom slay would be returned into the position of the open shed by the action of the buffer springs alone, the accumulated energy of the buffer springs must be entirely discharged during this operation, as otherwise a too heavy impact of the pawl 90 on the stop rod nib 95 would occur. In order to obtain the correct proportions, the friction brake is set in action at the same time, so that the latter partly consumes the discharge energy of the buffer springs.

One of the possible disturbances is the so-called shed breakage, which occurs if the flying shuttle fails to reach the opposite shuttle box and is trapped in the shed during its movement. Such a disturbance may be prevented, if the loom is arrested in due time, and for this purpose the well known device comprising a frog and a stop rod nib has been used, wherein the stop rod nib, which during the normal operation passes over the frog, drops into the frog and arrests the loom at once in case of a shed breakage. The impact of the stop rod nib on the frog is, however, of very high intensity and often causes frame breakages.

According to the embodiment of my invention shown in Fig. 2, the frog 106 is rotatably mounted on the pivot 107 arranged on the frame of the loom. A screw bolt 109 is attached to the side wall 110 of the loom and is provided with a hole, into which one end of a spring 108 is inserted. The other end of the spring 108 is secured to an intermediate point of the frog 106. The spring 108 counteracts a rotation of the frog in a clockwise direction and draws the frog against a stop 111 to hold it in this position. The lower end of the frog terminates in a segment 112. A lever 114 carrying a brake shoe 115 at its right-hand end is swingably mounted on a pivot 113 attached to the side wall of the loom. A spring 116 stretched between the side wall of the loom and the lever 114 draws the brake shoe 115 against the segment 112. The stop rod nib 117 is rotatably mounted on a pivot 118 secured to the loom slay. A lever 119 is rigidly connected to the stop rod nib 117. A spring 120 stretched between the stop rod nib 117 and the loom slay urges the lever 119 against a wedge 121.

Fig. 2 shows a sectional view of the shuttle box. If the shuttle 28 is in the box as shown in Fig. 2, the lever 119 is pressed to the left and the stop rod nib 117 remains in its elevated position against the action of the spring 120. Therefore, the stop rod nib passes over the frog, if the loom slay is moved forward.

If, however, the shuttle has not yet entered the box at the moment when the stop rod nib is in rear of the frog, the spring 120 draws the stop rod nib downwards, so that its free end engages with the abutment 122 of the frog and turns the frog in a clock-wise direction, whereby the projection 123 of the frog engages with an electrical switch 124 mounted in the side wall of the loom and opens the switch. This opening of the switch results in a disconnecting of the motor driving the loom from the network, as will be explained hereinafter.

The impact of the stop rod nib 117 on the frog is retarded by the spring 108, which is thus tensioned. Furthermore, the friction brake formed by the segment 112 and the brake shoe 115, smooths and reduces the impact.

Preferably the spring 108 has such a strength, that it entirely dampens the impact of the stop rod nib on the frog and in addition thereto is able to return the loom slay into the position of the open shed. The discharge energy of the spring 108 is dampened by the cooperating friction brake 112, 115.

Fig. 1 shows the essential parts of the loom, the driving motor, its connection with the loom slay, the combined buffer and friction brake, the electro-magnet for the control of the buffer and friction brake as well as the electrical remote control of the electro-motor and the mechanical brakes. Like reference characters indicate the same parts as indicated by like reference characters in the above described figures.

The three conductors R, S, T, of the network supply the electro-motor 125, which drives the loom shaft 47 by a suitable gearing 225, with current through the reversing switch 127, which is controlled by switch coils 130 and 131, and through the three-phase-lines 126*a*, 126*b*, 126*c*. The outline of the reversing switch 127 is shown by dash and dotted lines.

The reversing switch comprises the two switches 128 and 129. The switch 128 serves to switch the motor to normal direction of rotation as necessary for the normal operation of the loom, while the braking switch 129 serves to switch the motor to a reversed direction of rotation, in order to obtain a braking effect by reverse current. The switch coil 130 controls the switch 128, and the switch coil 131 controls the switch 129. The "on" push button 132 serves to start the device, and the "off"-push button 133 serves to stop the device.

The two switches 128 and 129 are also mechanically connected with each other. Each switch has a plurality of individual contact-fingers 128*a*—128*e* and 129*a*—129*d* respectively. A switching rod 134 provided with a pin 135 at its left-hand end connects the individual contact-fingers 128*a*—128*e* of the switch 128 with each other. The individual contact fingers 129*a*—129*d* of the switch 129 are connected with each other in a similar manner by a switching rod 136 having a pin 137 at its left hand end. A bar 140 swingably mounted on a pivot 141 secured to the frame of the reversing switch has two enlarged ends provided with slots 138 and 139. The pin 135 engages with the slot 138, and the pin 137 engages with the slot 139.

If the coil 130 is excited, the rod 134 is shifted to the right-hand and moves the contact fingers of the switch 128 connected therewith into their closing position. At the beginning of this shifting, the pin 135 slides unobstructedly within the slot 138. If, however, at the end of this shifting the pin 135 abuts against the right-hand end of the slot 138, the rod 134 turns the bar 140 about the pivot 141 in a counter-clockwise direction, whereby the slot 139 passes freely along the pin 137 without catching the rod 136 of the switch 129. When the shifting of the rod 134 is completed and the contact fingers of the switch 128 are in closing position, the pin 137 of the rod 136 is about in the center of the slot 139 which passed for a certain distance along the pin 137 as mentioned above. If the coil 131 is then excited, the latter draws the rod 136 to the right-hand, whereby at the beginning of this shifting of the rod 136, the pin 137 slides unobstructedly within the slot 139, until it abuts against the right-hand end of the slot 139. This unobstructed shifting of the rod 136 is used to interrupt the exciting circuit of the coil 130 as will be explained hereinafter. During the further shifting of the rod 136 to the right hand, the pin 137 engaging with the right-hand end of the slot 139 turns the bar 140 about its pivot 141 in a clock-wise direction, whereby the right-hand end of the slot 138 engaging with the pin 135 draws the rod 134 to the left-hand, so that the remanent magnetism inherent to the coil 130 is overcome and the switch 128 is opened.

In order to start the operation of the loom, the spring loaded "on"-push button 132 is pushed downwards for a short time, so that its contact bridge 132*a* contacts the lower terminals 132′ and 132″. The following circuit is thus completed: From the conductor of the network through the fuse 142 and the switch coil 130 to the point *a*; from this point *a* through the terminals 132′, 132″ bridged by the contact bridge 132*a* and the line 147 to the conductor T.

Thus, the coil 130 is excited and draws the switching rod 134 to the right-hand, so that the main contact fingers 128*c*, 128*d*, 128*e* and the auxiliary contact fingers 128*a*, 128*b* of the switch 128 are brought in closing position. The "on"-push button, which is pressed downwards only for a short time, is returned by its spring into its normal position, in which the lower terminals 132′ and 132″ are open but the upper terminals 232′ and 232″ are closed by the bridge 132*a*. The excitement of the coil 130 continues, however, as the following holding circuit for the coil 130 is closed by the auxiliary contact finger 128*b* of the switch 128: From the conductor S through the coil 130 to the point *a*; from this point *a* to the terminal 143 of the auxiliary contact closed by the contact finger 128*b*, then through said contact finger 128*b* to the terminal 145 of the auxiliary contact controlled by the switch 129, then through the contact finger 129*a* and the line 245 to the upper left-hand terminal 146′ of a switch controlled by a push-button 146, then through the left-hand contact bridge 146*a* secured to the push-button, through the lower left-hand terminal 146″ of said switch, through the closed switch 124 (controlled by the frog 106 as shown in Fig. 2) to the lower righthand terminal 132″ of the "on"-switch, and then through the line 147 to the conductor T.

If the coil 130 closes the switch 128 in the above described manner, the main contact fingers 128*c*, 128*d*, 128*e* thereof are brought into closing position, and the electro-motor 125 receives current from the conductors R, S, T, through said main contact fingers and the lines 126*a*, 126*b*, 126*c*. Thus, the motor is started and drives the loom.

If a shed breakage occurs, the contact 124 is opened automatically, so that the holding current circuit for the coil 130 is interrupted and the switch 128 is opened under the influence of the spring 230. The motor 125 and the loom connected thereto are stopped. This action is accelerated by means of the buffer brake 108 and the friction brake 112, 115.

As soon as a different disturbance occurs, the switch 35, 37 (Figs. 1 and 6) is closed as described above, so that the following exciting circuit for the magnet coil 131 controlling the switch 129 is closed; From the conductor S through the fuse 142 to the point *c*, then through the coil 131 to the point *b*, then through the line 148 to the lower right-hand terminal 246″ of the switch controlled by the push-button 146, then through the right-hand contact bridge 146*b*, of said switch to the upper right-hand terminal 246′, then through the line 346, through the terminals 232′ and 232″ closed at this time by the contact bridge 132*a*, through the line 149, through the closed switch 35, 37, through the line 150 to the open terminal 151, then through the line 250 to the terminal 144, then through the contact finger 128*a* contacting the terminal 144 at this moment, through the lines 244 and 245, through the left-hand terminals 146′, 146″ of the switch 146, through the switch 124, through the line 147 to the conductor T.

Thus the coil 131 is excited and draws the rod 136 to the right-hand, whereby the contact-fingers 129*a*—129*d* connected with said rod 136 are brought into their closing position. During the first part of this movement of the rod 136, i. e. during the idle passing of the pin 137 in the slot 139 until its engagement with the right-hand end of said slot, the T-shaped contact-finger 129*a* is disengaged from the terminal 145 and brought in contact with the terminal 151, so that the above described holding circuit for the coil 130, which includes the terminal 145, is interrupted. Therefore, the resistance of the coil 130 controlling the rod 134 against a further movement of the rod 136 connected to said rod 134 through the medium of the lever 140 disappears, and the coil 131 may draw the rod 136 further to the right-hand. During this second part of the movement of the rod 136, i. e. after the engagement of the pin 137 with the right-hand end of the slot 139, the main contact-fingers 129*b*, 129*c* and 129*d* are brought into their closing position, whereby at the same time all contact-fingers 128*a*—128*e* of the switch 128 are brought into their open position, as the coil 131 draws the rod 134 to the left-hand into the position shown in Fig. 1 by means of the rod 136, pin 137, lever 140 and pin 138. The closing of the main contact-fingers 129*b*, 129*c* and 129*d* of the switch 129 causes the braking of the electro-motor 125 by reverse current.

One end of the coil of the electro-magnet 83 is connected to the point *b*, the other end thereof is connected to the point *c*, so that the coil of the electro-magnet and the exciting coil 131 are connected in parallel and are excited at the same time. As described above, the electro-magnet 83 controls the buffer and friction brake, so that the latter are brought into effect simultaneously with the braking by reverse current.

Shortly before the stop 102 (Fig. 7) abuts against the abutment 103, the controlling switch

35, 37 (Figs. 1 and 6) is opened, as at this moment the adjusting collar 39 is engaged with the roller 33 and removes the contact-bridge 35 from the stationary terminals 37. This opening of the switch 35, 37 interrupts the exciting circuit for the coil 131, so that a spring 231 may return the rod 136 into the position shown in Fig. 1, whereby the main contact fingers 129b, 129c, 129d are brought into open position and the braking by reverse current is terminated. Then, the combined buffer and friction brake produces an after-effect, as the stretched buffer-springs tend to contract and the friction brake is still effective during the contraction of the springs. During this phase of the arresting operation, the loom slay is returned by the contraction of said springs into the position of the open shed, whereby a positive arresting of the loom occurs due to the engagement of the stop rod nib 95 with the pawl 90.

The above described sequence of arresting steps, which occurs automatically in case of a disturbance and substantially consists in the braking by reverse current, by a buffer and by friction, may also be started arbitrarily by hand, if a spring-loaded push-button 133 is pressed downwards for a short time, so that the contact-bridge 133a secured thereto connects the lower terminals 232' and 232'' with each other, whereby the electro-magnet 42 connected to said terminals is excited and lifts the pawl 43 (Fig. 3). Thus, the nose 46 of the pawl 43 engages with the recess 45 of the bar 6 at the particular moment, when the loom slay 1 is in the position, in which the bar 6 would be locked by the lever 23 cooperating with the recess 21 in case of a disturbance. In this manner, the switch 35, 37 is also closed, if the loom slay continues its movement against the breast beam. The exciting circuit of the electro-magnet 42 is connected to the secondary winding 153 of a transformer, the primary winding of which is formed by the switch coil 130. Therefore, it is necessary, that the coil 130 be excited, in order that the winding 153 of the transformer be under tension, i. e. that the electro-magnet 42 can be excited. If the stop push-button switch 133 is pressed, the exciting circuit of the electro-magnet 42 is as follows: From one end of the secondary winding 153 through the point *d*, through the line 154, to the lower terminal 233'', then through the contact bridge 133a to the terminal 233', then through the line 254 to the point *f*, then through the line 155, through the coil of the electro-magnet 42, through the line 156 to the point *g*, and from this point back to the other end of the secondary winding 153.

The excitement of the magnet 42 results in the closing of the controlling switch 35, 37 and the excitement of the braking electro-magnet 83 for a short time, as will be easily understood by the foregoing explanations so that the pressing of the push-button 133 of the hand switch likewise produces a braking by reverse current of brief duration, renders active the combined buffer and friction brakes and arrests the loom in the position of the open shed. It does not matter that after a certain period no current flows through the coil 130 and the winding 153, as it is only necessary that the nose 46 of the pawl 43 becomes engaged with the recess 45 of the bar 6. Then the further movement of the loom slay exerts the necessary pressure on the bar 6 to hold the nose 46 in engagement with the recess 45.

It may be noted, that the specific mechanical coupling of the two electrical switches 128 and 129 through the medium of the lever 140 and pin and slot connection 135, 137, 138, 139 permits an immediate closing of the switch 129, although the coil 130 is still excited, if the closing of the switch 129 is started; during the first part of the movement of the switching rod 136 the contact-finger 145 controlling the holding circuit of the coil 130 is brought into open position, and during the second part of this movement the remanent magnetism, which is still inherent to the coil 130 and tends to prevent the switch 128 from being opened instantaneously, is at once overcome by the action of the coil 131, which is now excited.

A switch 157 is connected in parallel to the lower terminals 233' and 233'' of the switch controlled by the push button 133. This switch is automatically closed, if a breakage of the warp threads occurs, and starts the same sequence of steps as they are initiated by pressing down the push-button 133.

Fig. 11 shows a device known per se for closing the contact 157. For the sake of clarification the warp threads 160 are shown spaced from each other for a comparatively large distance, although they are arranged closely to each other in the loom. A metallic segment 161 provided with a slot 162 is suspended from each warp thread 160. A guide rod 163 passes through the slots 162 and is secured to the loom frame at both ends. Said rod serves to guide the segments, if they drop due to a breakage of the warp threads. Bus-bars 164 and 165 are arranged below said segments 161. Each of said bus-bars is connected with a conductor of the network. The bus-bars extend across the entire width of the loom. The ends of the bus-bars are secured to the loom, insulations being arranged between the loom and the bus-bars.

If a warp thread breaks, the respective segment 161 suspended therefrom drops and causes an electrical connection between the two bus-bars 164 and 165. This operation represents the closing of the contact 157 diagrammatically shown in Fig. 1.

The exciting circuit for the coil 131 includes the upper terminals 232' and 232'' of the push-button switch 132 as described above. As, after the insertion of a new shuttle bobbin, the weft thread does not as yet lie below the weft needle 24, the loom would be arrested at once, if the push button 132 pressed down to start the operation of the loom, would not be kept in this pressed position with its bridge 132a remote from the terminals 232' and 232'', until the first shot occurred, as otherwise the weft needle 24, which has no thread to rest on, would initiate the arresting of the loom by closing the exciting circuit for the coil 131 including the terminals 232' and 232''. As soon as the first shot is completed, a weft thread lies below the weft needle 24. Thus, if the push-button 132 is kept down during the restarting operation of the loom after the insertion of a new shuttle bobbin, until the first shot has been completed, and then will be released and returned by its spring into the position shown in Fig. 1, whereby the bridge 132a contacts the upper terminals 232' and 232'', the loom will not be arrested at once, as now a weft thread lies below the weft needle 24, and the weft thread guard will act in its normal manner after the occurrence of a disturbance.

As described above, the switch 128 remains in its closed position by means of the holding cir-

cuit for the coil 130 including the auxiliary switches 129*a*, 145 and 128*b*, 143, if the push-button 132 returns into its upward position shown in Fig. 1 after having been pressed down for a short time to start the operation of the loom. This holding circuit also includes the terminals of the push-button switch 146. Furthermore, the disturbance circuit or exciting circuit for the coil 131 completed by the closing of the switch 35, 37 also includes the terminals of said push-button switch 146. Thus, if only short movements of the loom slay shall be initiated by pressing the push-button 132, the holding circuit as well as the disturbance circuit, which may be completed by the weft thread guard through the switch 35, 37, must be interrupted, so that on the one hand short movements of the loom slay corresponding to the time of pressing the push-button 132 are obtained and on the other hand the weft thread guard cannot become effective during these short movements. For this purpose, the interrupting push-button switch 146 has to be pressed down into a position, in which its bridges 146*a* and 146*b* are disengaged from the terminals 146′ and 246′, in order to interrupt the above mentioned circuits and render possible short movements of the loom slay by pressing the push-button 132. The push-button 146 is not spring loaded and remains in its pressed position, until after the completion of the short movements the push-button 146 is returned by hand into its operative position shown in Fig. 1.

As will be easily understood from the above explanations, the electrical remote control not only renders possible the normal switching on and switching off of the electro-motor driving the loom, but also renders possible the obtaining of the desired arresting operation under the action of the various kinds of brakes irrespectively of the fact, whether the impulse for the arresting operation is given arbitrarily by hand or by the disturbance guard due to the occurrence of a disturbance. The described control also renders possible the production of short movements of the loom slay and the prevention of the effectiveness of the weft thread guard prior to the first shot after the start of the loom.

I have described a preferred embodiment of my invention but it is clear that numerous changes and omissions may be made without departing from the spirit of my invention.

What I claim is:

1. A mechanism for stopping electrically driven looms comprising: a loom having a loom shaft, a reciprocating loom slay, a breast beam, and means connecting said loom shaft with said loom slay; an electro-motor having a driving shaft; means connecting said driving shaft with said loom shaft; a buffer brake arranged on said loom shaft; a friction brake mounted on said loom shaft; controlling means arranged on said loom and adapted to operate in case of a disturbance; a braking switch electrically connected to said electro-motor and adapted to produce a braking of the electro-motor by reverse current; a braking electro-magnet adapted to render active said buffer and friction brake; a controlling switch adapted to be actuated by said controlling means and electrically connected to said braking switch and said braking electro-magnet; means arranged on said buffer brake to determine a positive braking path up to a predetermined front position of the loom slay; resilient means arranged on said buffer brake adapted to return the loom slay from said predetermined front position into its substantially furthest rear position; and means timing the brakes in such a way, that the braking by reverse current, by buffer and by friction become active at the same time, whereupon the braking by reverse current is stopped shortly before the buffer brake arrests the loom slay in the predetermined front position, whereupon the friction brake alone remains active during the return of the loom slay into its rear position by said resilient means.

2. In a mechanism according to claim 1 the arrangement of a stop adapted to arrest positively the loom shaft after the return of the loom slay into its furthest rear position by said resilient means.

3. In a mechanism according to claim 1, said buffer brake comprising two disks, one of said disks being rigidly connected to said loom shaft, the other disk being loosely arranged on said loom shaft; springs stretched between said disks; a stop rigidly mounted on said loosely arranged disk; a stop rod nib movably arranged on said loom and adapted to cooperate with said stop; and connecting means disposed between said stop rod nib and said braking electro-magnet to render possible a movement of said stop rod nib into the path of said rigid stop by said braking electro-magnet.

4. In a mechanism according to claim 1, said buffer brake comprising two disks, one of said disks being rigidly connected to said loom shaft, the other disk being loosely arranged on said loom shaft; springs stretched between said disks; a stop rigidly mounted on said loosely arranged disk; a stop rod nib movably arranged on said loom and adapted to cooperate with said stop for rendering effective said buffer brake and producing a relative movement between said two disks; connecting means disposed between said stop rod nib and said braking electro-magnet to render possible a movement of said stop rod nib into the path of said rigid stop by said braking electro-magnet; a pawl pivotally mounted on said loosely arranged disk; a lug rigidly mounted on said rigidly mounted disk and adapted to swing said pawl into operative position about its pivot during said relative movement of the disks; and an additional stop rod nib rigidly mounted on the loom and arranged in the path of said pawl swung into operative position, said additional stop rod nib cooperating with said pawl to stop the loom returned by said springs and returning said pawl into its inoperative position during the normal rotation of said disk.

5. In a mechanism according to claim 1, said buffer brake comprising two disks, one of said disks being rigidly connected to said loom shaft, the other disk being loosely arranged on said loom shaft; springs stretched between said disks; a stop rigidly mounted on said loosely arranged disk; a stop rod nib movably arranged on said loom and adapted to cooperate with said stop for rendering effective said buffer brake and producing a relative movement between said two disks; connecting means disposed between said stop rod nib and said braking electro-magnet to render possible a movement of said stop rod nib into the path of said rigid stop by said braking electro-magnet; a pawl pivotally mounted on said loosely arranged disk; a lug rigidly mounted on said rigidly mounted disk and adapted to swing said pawl into operative position about its pivot during said relative movement of the disks; said friction brake comprising a flange arranged on said rigidly mounted disk and spring-loaded brake shoes positively

connected to said movably mounted disk, said brake shoes cooperating with said flange during the relative movement of said two disks; and an additional stop rod nib rigidly mounted on the loom and arranged in the path of said pawl swung into operative position, said additional stop rod nib cooperating with said pawl to stop the loom returned by said springs and returning said pawl into its inoperative position during the normal rotation of said disk.

6. A mechanism according to claim 1 in combination with an electrical remote control, said controlling means being adapted to actuate said electrical remote control, and said electrical remote control being adapted to actuate said brakes.

7. A mechanism according to claim 1 in combination with an electrical remote control, said controlling means being adapted to actuate said electrical remote control, a hand stop switch being adapted to actuate said electrical remote control, and said electrical remote control being adapted to actuate said brakes.

8. A mechanism according to claim 1 in combination with an electrical remote control, said controlling means being adapted to actuate said electrical remote control, a hand stop switch, locking means adapted to render operative said controlling means in the same position as in case of a disturbance, said locking means being electrically connected to said hand stop switch, and said electrical remote control being adapted to actuate said brakes.

9. In a mechanism according to claim 1 a cam arranged on said loom slay, said cam being adapted to open said controlling switch in the front position of the loom slay for terminating the braking by reverse current.

10. A mechanism according to claim 1 in combination with an electrical remote control, said controlling means being adapted to actuate said electrical remote control, a frog pivotally mounted on said loom, a stop rod nib arranged on said loom slay and adapted to rotate said frog, a brake and dampening means adapted to dampen the movement of said frog, and a switch adapted to actuate said electrical remote control, said frog being adapted to control said switch, and said electrical remote control being adapted to stop said electro-motor and to actuate said brakes.

11. A mechanism according to claim 1 in combination with an electrical remote control, a hand "on"-switch and a hand "off"-switch arranged in the circuit of said electrical remote control adapted to start and terminate the normal operation of the loom, said controlling means being adapted to actuate said electrical remote control, and said electrical remote control being adapted to actuate said brakes.

12. A mechanism according to claim 1 in combination with an electrical remote control, a spring-loaded hand "on"-switch and a spring-loaded hand "off"-switch arranged in the circuit of said electrical remote control, said "on"-switch having a pair of upper terminals and a pair of lower terminals the lower terminals being included in the circuit adapted to start the electro-motor, the upper terminals being included in the circuit connected to said controlling switch, the spring urging the "on"-switch against said upper terminals, said controlling means being adapted to actuate said electrical remote control, and said electrical remote control being adapted to actuate said brakes.

13. A mechanism according to claim 1 in combination with an electrical remote control, a spring-loaded hand "on"-switch and a spring-loaded hand "off"-switch arranged in the circuit of said electrical remote control, said "on"-switch having a pair of upper terminals and a pair of lower terminals, the lower terminals being included in the circuit adapted to start the electro-motor, the upper terminals being included in the circuit connected to said controlling switch, the spring urging the "on"-switch against said upper terminals, and an interrupting hand switch, said interrupting hand switch being included in the holding circuit of the remote control for the maintenance of the operation of the loom and in the circuit including said controlling switch, said interrupting hand switch being adapted to remain in a position interrupting said circuits, said controlling means being adapted to actuate said electrical remote control, and said electrical remote control being adapted to actuate said brakes.

WILHELM LOHSSE.