Oct. 9, 1951 R. H. ROUGHSEDGE ET AL 2,570,381

STOP MOTION FOR TEXTILE MACHINES

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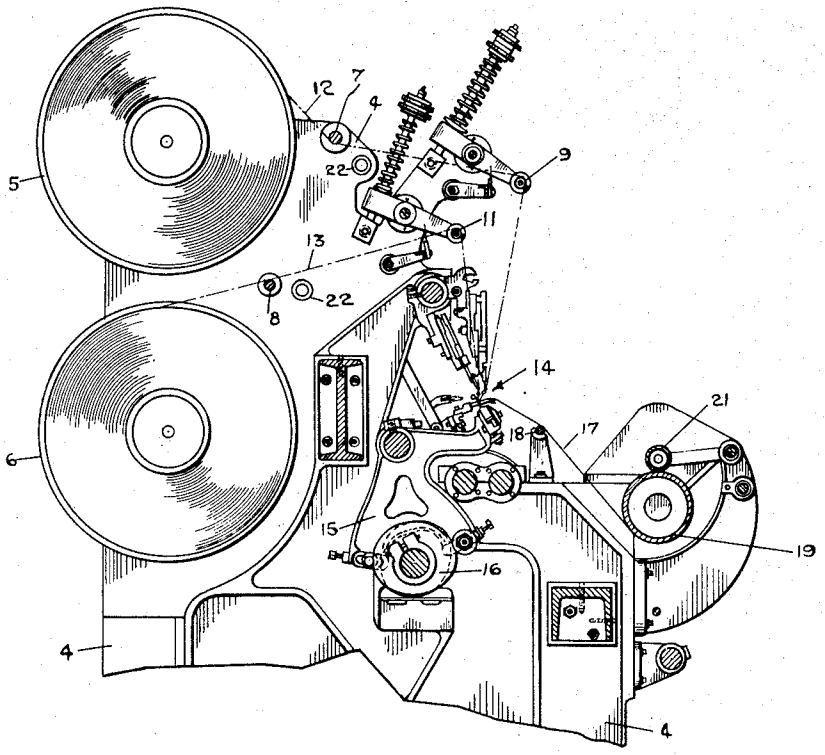


Fig. 1

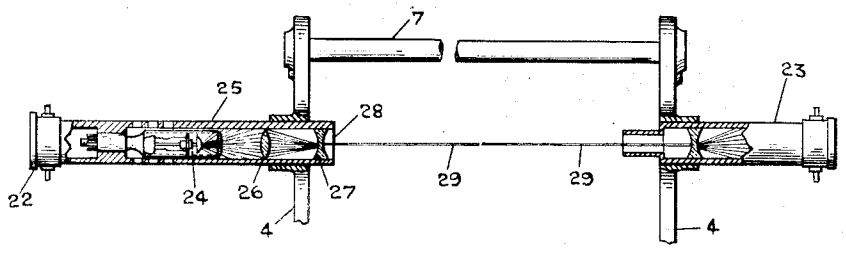


Fig. 2

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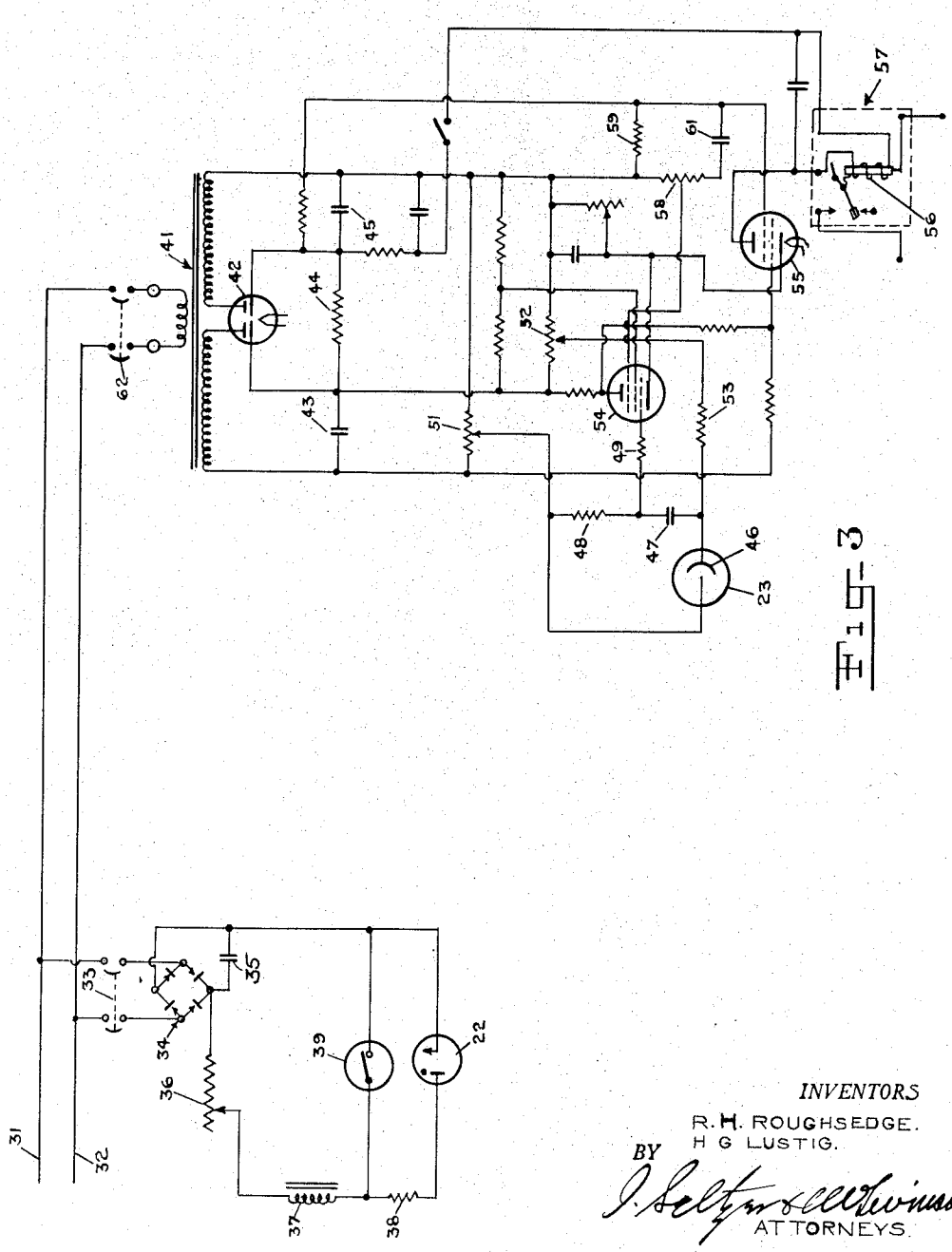


FIG. 3

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STOP MOTION FOR TEXTILE MACHINES

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1 Claim. (Cl. 66—163)

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This invention relates to stop motions for knitting machines, looms and like textile machines wherein a warp of yarns is fed to operating elements, and relates more particularly to stop motions for warp knitting machines.

An important object of this invention is the provision of improved device which may be readily applied to a warp knitting machine or loom and which, upon breakage of a warp yarn, will activate the stop motion of the machine to halt the operation thereof.

Another object of this invention is to provide a novel device for activating the stop motion of a warp knitting machine or loom upon breakage of a warp yarn, comprising a light source for emitting a long thin bundle of light rays traversing the full width of the warp knitting machine and a photo-electric tube for receiving said light rays.

Other objects of this invention, together with certain details of construction and combinations of parts, will appear from the following detailed description.

According to this invention, a warp stop device comprises two basic units, a light source which may readily be attached to one end of a warp knitting machine and a photo-electric relay to the other end thereof. A long thin bundle of light rays emerges from the light source, traverses the entire width of the warp knitting machine in such a position that any broken yarn ends will pass through said light rays, and finally enters the photo-electric tube. The passing of the broken yarn end through the light rays causes a decrease in the intensity of the illumination upon the cathode of the photo-electric tube, causing the energization of a control relay through suitable electrical connections. The control relay operates a switch to open the warp knitting machine motor circuit to halt the operation of the machine.

This invention will now be described in greater detail with reference to the accompanying drawings, it being understood, however, that this description is given by way of example only and is in no respect limitative.

Fig. 1 shows diagrammatically the positioning of the light source unit in the frame of a two-bar warp knitting machine, only part of which is shown,

Fig. 2 is a front elevational view, partly in section, showing the mountings of the light source unit and of the photo-electric tube, and

Fig. 3 is a schematic diagram of the photo-electric relay and light source power supply.

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Like reference numerals indicate like parts throughout the several views of the drawings.

In Fig. 1, there is shown the frame 4 of a two-bar warp knitting machine on which are supported warp beams 5 and 6, guide rods 7 and 8, and tension rods 9 and 11, over which warps 12 and 13 are passed on their way to the knitting elements generally indicated by reference numeral 14. These knitting elements, as is well understood in the art, are operated by means of connecting elements, connected to the cam shaft 16 of the machine. The knitted fabric 17 passes over guide rod 18 and under-roller 19 and on to take-up roller 21.

Positioned beneath each warp 12 and 13 is stop motion device comprising a light source 22 and a photo-electric tube 23. The position of these light sources 22 is such that a broken end or ends of the warp yarn would fall in the path of the light rays issuing from said light sources. The light source may be any suitable device which is capable of emitting a long thin light ray. It is preferred, however, to employ a concentrated arc lamp 24 having a pin point light source. The lamp is housed in a light absorbing shield 25. The lamp 24 in conjunction with lenses 26 and 27 and iris 28 produces a bundle of light rays 29 so fine that even a yarn end of small denier passing through said beam of rays 29 will reduce materially the cross-section of the beam and decrease the average intensity of illumination upon the cathode of the photo-electric tube 23 from 1 to 5%.

Fig. 3 shows the circuit for supplying power to the light source 22 and to the photo-electric relay circuit in which photo-electric tube 23 is located. The power supply circuit comprises alternating current supply lines 31 and 32, say, from a regulated 117 volt supply, which lead through a disconnect switch 33 to a bridge rectifier 34 having a condenser 35 across the line on its output side. The rectified current passes through a variable resistor 36 and a reactance coil 37 to a fixed resistance 38 to the light source 22. A vacuum snap switch 39 is placed in parallel with the light source 22. To energize the light source, switch 39 is first closed and then switch 33 is closed. This causes a large current to flow through the reactance coil 37 and, upon snapping open switch 39, a high-voltage impulse originating in reactance coil 37 causes the energization of the arc lamp 24 and the emission of the beam of light in a continuous manner.

A photo-electric relay circuit receives its current supply from alternating current supply lines

31 and 32 through a transformer 41. The current passes through a rectifier tube 42 which with condenser 43, resistor 44 and condenser 45 forms a rectifying and filtering network.

When the light beam 29 is uncut by a yarn end, the steady state of illumination causes a fixed or steady rate of electronic emission from the cathode 46 of the photo-electric tube, which tube is capacity coupled to an amplifying system by means of condenser 47 and resistors 48 and 49. Potentiometers 51 and 52 and resistor 53 serve to put the proper photo-electric tube anode voltage across the photo-electric tube circuit. The amplifying system comprises amplifier tubes 54 and 55 having suitable electrical connections to obtain a stable amplifying system. Such connections are well known in the art and are, therefore, not indicated on the drawing.

When the light beam 29 is intersected by a broken yarn end or ends, the illumination reaching the photo-electric tube cathode 46 is suddenly decreased. This sudden change of illumination intensity reaching the said cathode 46 causes a decrease in anode current in the photo-electric tube, which in turn effects an increase in the plate currents of the amplifier tubes 54 and 55. The plate current from amplifier tube 55 energizes coil 56 of a control relay generally indicated by reference numeral 57, whereby the machine motor circuit is opened and the operation of said machine halted.

Since the signal from the photo-electric tube is of short duration, means are provided to cause the current to pass through the relay 57 for a time interval sufficient to effect the operation of the said relay. This means comprises a variable resistor 58, resistor 59 and condenser 61, all of which elements are in the network of amplifier tube 54.

A disconnect switch 62 may be inserted in the alternating current supply lines 31 and 32 leading to the transformer 41.

It will be appreciated that the control relay may also operate a visual or audible signal upon energization of the same by the means above described.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

In a textile machine wherein a warp of yarns is fed to operating elements, means for stopping the operation of said machine upon breakage of a warp yarn, said means comprising a light source, including a concentrated arc lamp having a pin point light source, lenses and an iris, a power supply circuit for the same and a vacuum snap switch in said circuit in parallel with said light source, for projecting a concentrated beam of light rays across the entire width of said machine fixed at one lateral end of said machine and a photo-electric tube for receiving said light rays fixed at the other lateral end of said machine, operative means controlled by said photo-electric tube adapted to operate a relay to stop the machine upon the passing of a broken yarn end through said beam of light rays, an electric circuit connecting said photo-electric tube and said relay and means including a potential dividing resistance and a condenser in said circuit adapted to provide feedback and to cause the current to pass through said relay for a time interval sufficient to effect the operation of said relay.

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