

May 26, 1964

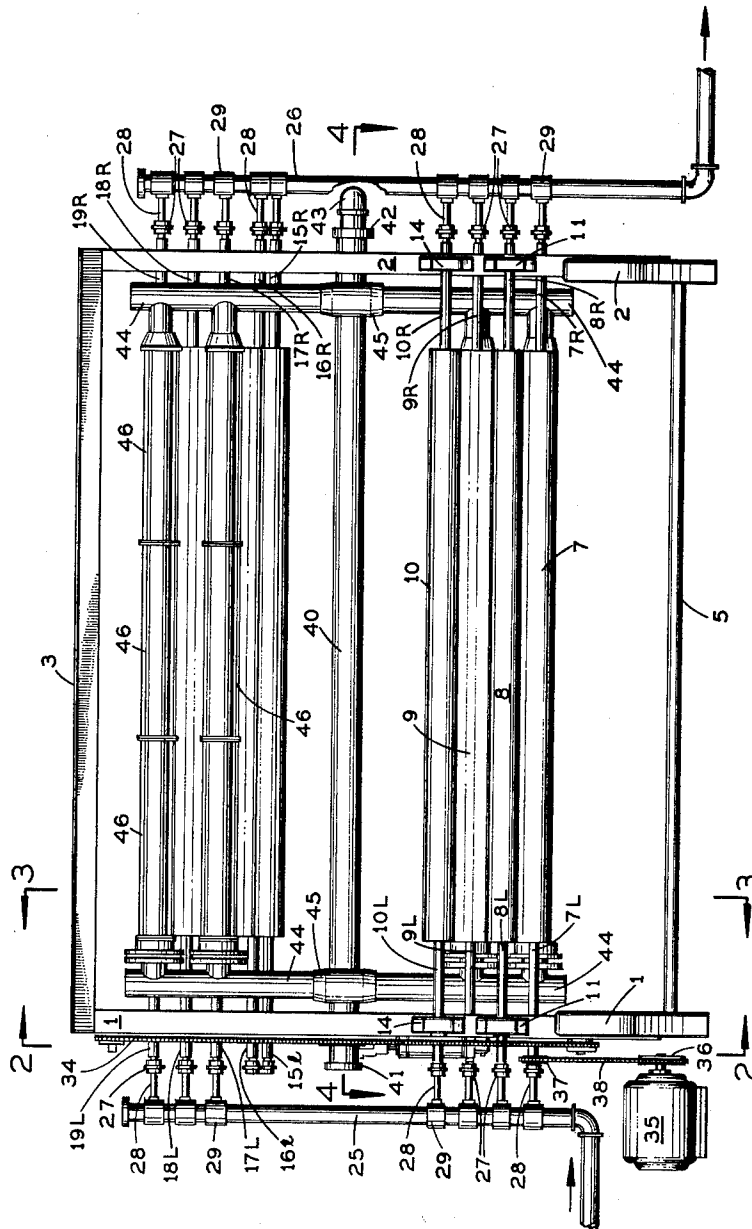
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3,134,158

SINGEING MACHINE FOR SYNTHETIC FABRICS

Filed March 27, 1962

5 Sheets-Sheet 1



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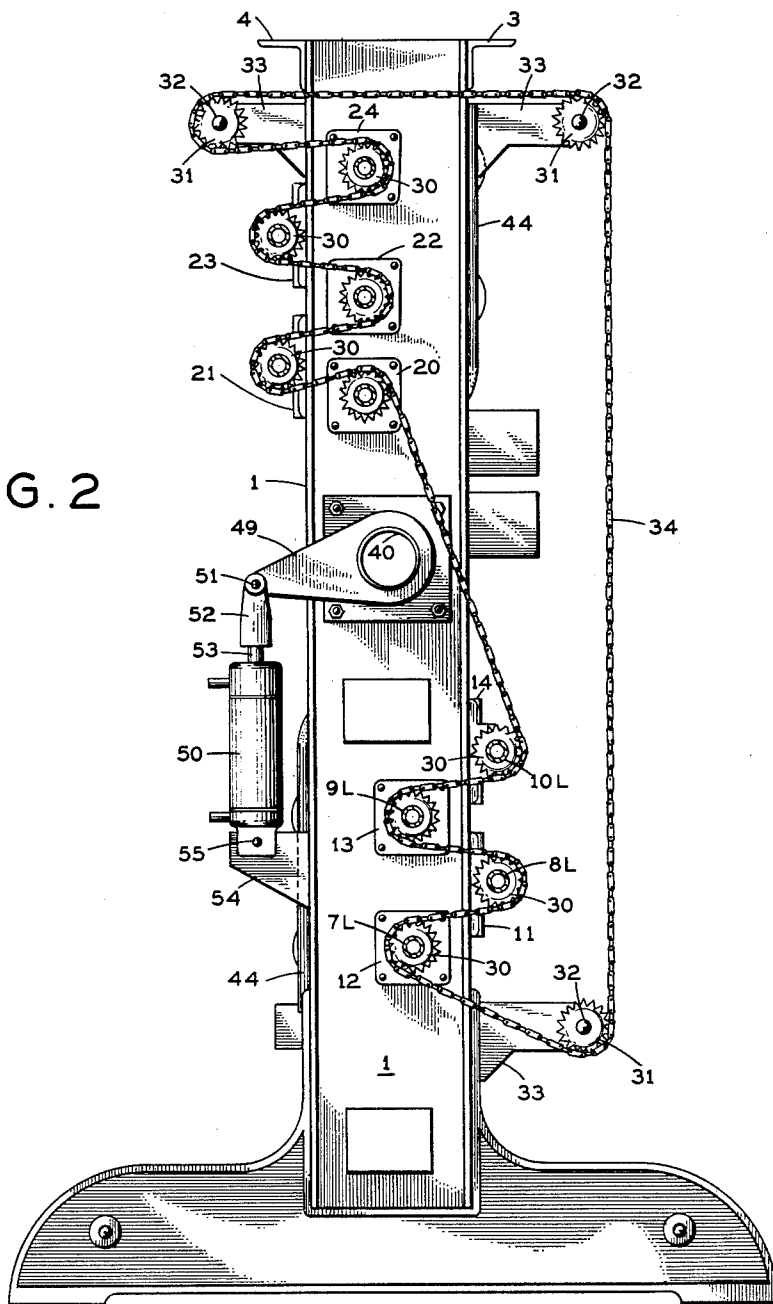
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SINGEING MACHINE FOR SYNTHETIC FABRICS

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FIG. 2



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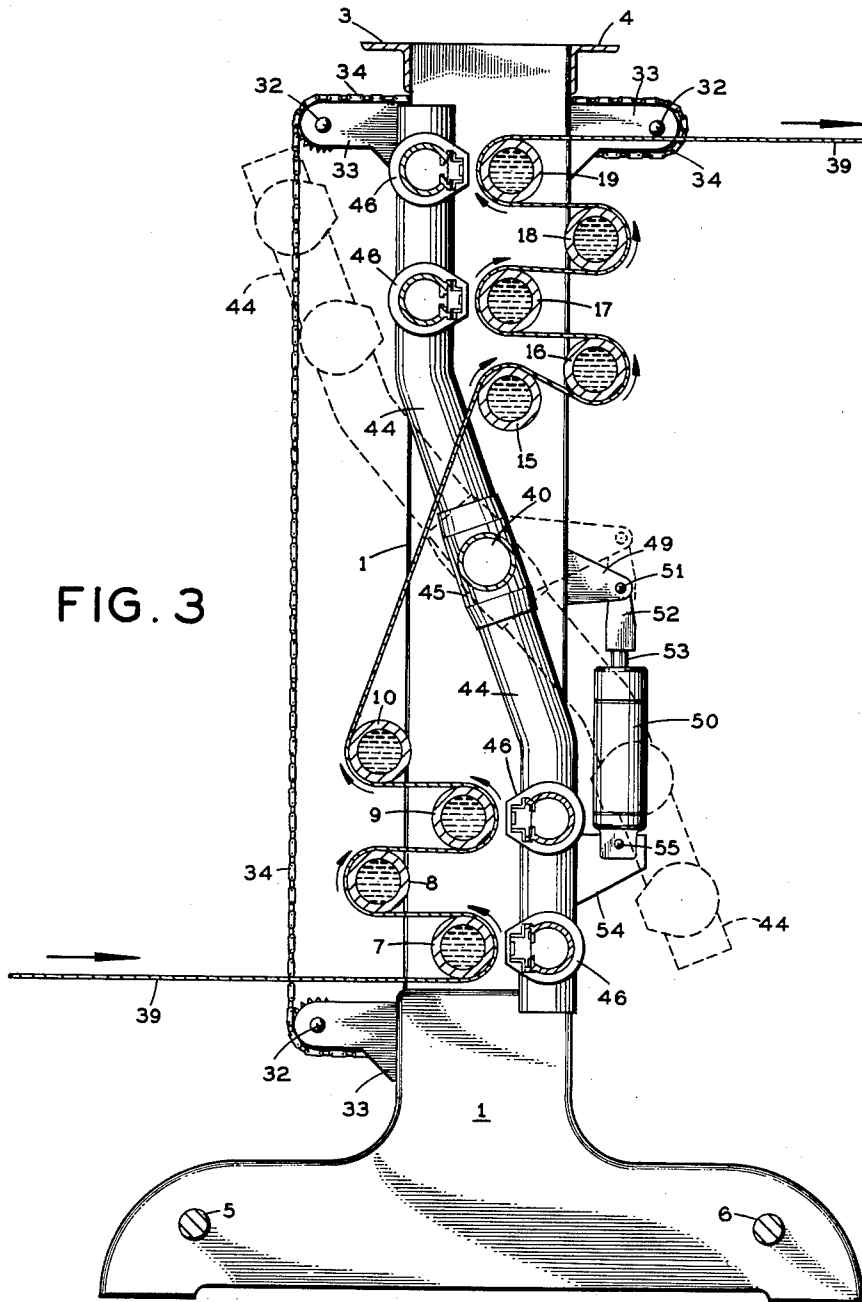
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SINGEING MACHINE FOR SYNTHETIC FABRICS

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SINGEING MACHINE FOR SYNTHETIC FABRICS

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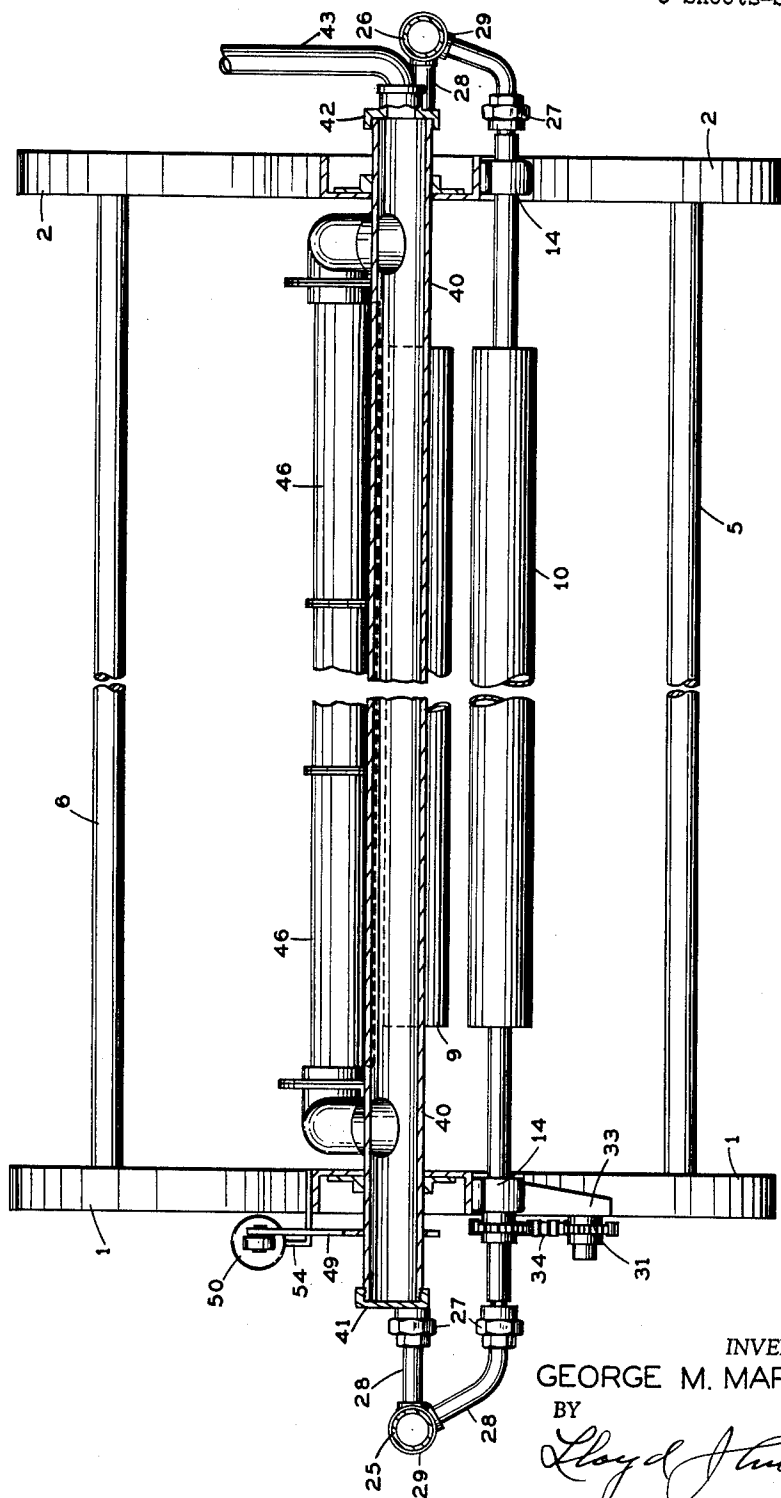


FIG. 4

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SINGEING MACHINE FOR SYNTHETIC FABRICS

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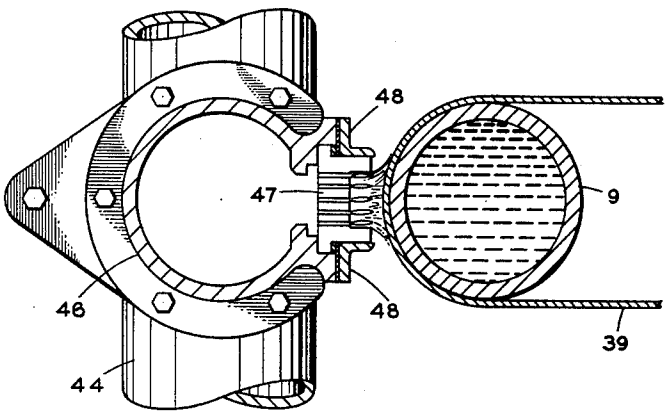


FIG. 5

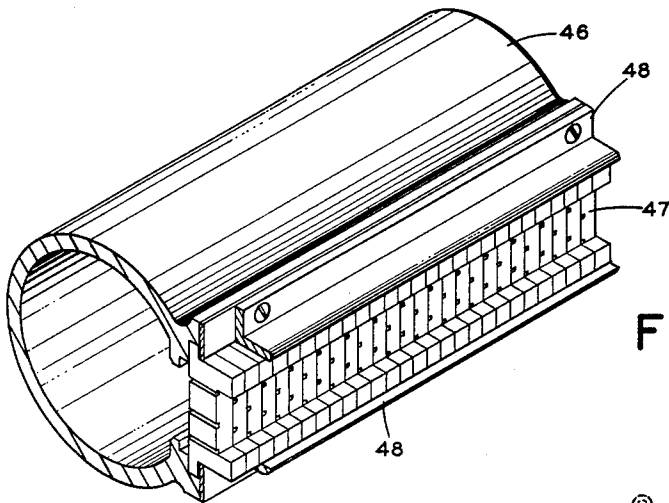


FIG. 6

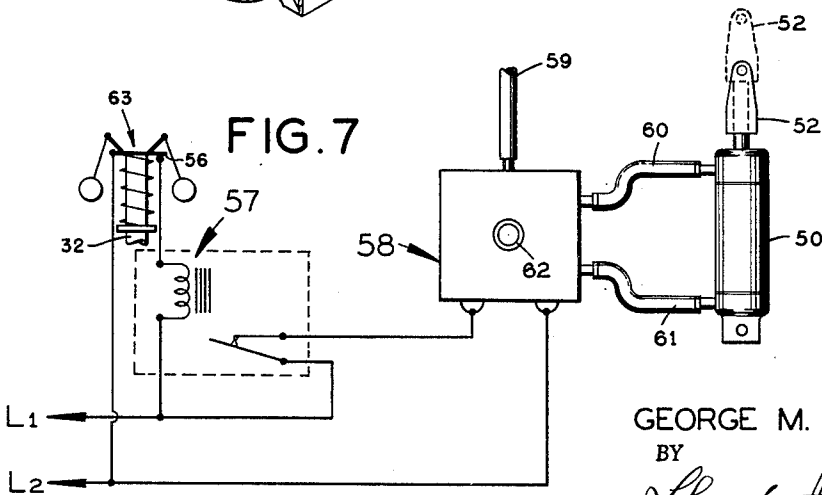


FIG. 7

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SINGEING MACHINE FOR SYNTHETIC FABRICS
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4 Claims. (Cl. 26—3)

This invention relates in general to textile machinery and more particularly to a machine for the continuous singeing of undesired fibers extending from cloth.

Prior flame singeing machines are inadequate for singeing extraneous fibrous ends from cloth woven from synthetic fibers largely because the thermoplastic properties of synthetic fiber results in the formation of small beads or "pills" instead of decomposition of the fibrous ends which normally occur in cloth woven from natural thread such as cotton and wool. A further fault in prior singeing machines resides in their inability to reach and eliminate the fibrous ends normally positioned in the interstices between the threads of the cloth.

The present invention overcomes the above objections and disadvantages by the provision of automatic means for flame singeing continuously moving synthetic cloth or cloth woven from a mixture of natural synthetic fiber and driven by a system of rolls and the application of a linear flame to the surface of the cloth pre-expanded by said rolls which is a principal object of the invention.

A further object of the invention is the provision of a multi-roll machine for conducting a woven fabric there-through at relatively high speeds, forming same over relatively small diameter rolls for exposing fibrous ends in the interstices between threads and singeing same with a flame from a linear burner.

A further object of the invention is the provision in a singeing machine for exposing both sides of a continuously moving cloth to a linear flame while expanded over rotating rolls for exposing fibrous ends in the interstices of the cloth to direct flame singeing.

Another object of the invention is the provision in a singeing machine of a safety means for the automatic withdrawal of the singeing burners normally supplying a linear flame against the surface of a moving cloth when the movement of the cloth is stopped or the linear velocity of the cloth through the machine is reduced below a predetermined normal speed.

These and other objects and advantages in one embodiment of the invention are described and shown in the appended specification and drawings in which:

FIG. 1 is a front elevation of the singeing machine in reduced scale.

FIG. 2 is a side elevation taken through section line 2—2, FIG. 1.

FIG. 3 is a side elevation taken through section line 3—3, FIG. 1.

FIG. 4 is a top plan view taken through section line 4—4, FIG. 1.

FIG. 5 is a cross-sectional fragmentary view of a burner assembly, shown in FIGS. 1 and 4, in singeing position.

FIG. 6 is a fragmentary perspective view of a burner assembly, shown in FIG. 5.

FIG. 7 is a schematic diagram of the electric and pneumatic circuits for operating the machine, shown in FIG. 1.

Referring to FIG. 1, a main frame for supporting all elements of the machine consists of a pair of upright supports 1 and 2 retained in rigid parallel spaced relation by angles 3 and 4 and bars 5 and 6 and including appropriate means for securing the frame to a floor, not shown.

Referring to FIGS. 1, 2 and 3, a lower group of hollow rolls 7, 8, 9 and 10 of like diameter are supported for rotation at the left ends thereof by coaxial hollow shafts 7L, 8L, 9L and 10L respectively and supported at the

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right ends thereof by coaxial hollow shafts 7R, 8R, 9R and 10R respectively. Each pair of shafts extending from each lower roll is journaled for rotation in parallel upright supports 1 and 2 by corresponding bearings 12—12, 11—11, 13—13 and 14—14 respectively as shown in FIG. 2.

An upper group of five hollow rolls 15, 16, 17, 18 and 19 of like diameter are supported by coaxial hollow shafts 15L, 16L, 17L, 18L and 19L respectively at the left ends thereof and by coaxial hollow shafts 15R, 16R, 17R, 18R and 19R respectively. Each pair of shafts extending from each roll is journaled for rotation in upright supports 1 and 2 by corresponding bearings 20—20, 21—21, 22—22, 23—23 and 24—24 respectively, as shown in FIG. 2.

Referring to FIG. 1, an inlet header 25 is secured adjacent support 1 and is adapted to be connected to a source of cooling water, not shown. An exhaust header 26 is positioned adjacent support 2 for conducting the cooling water from the machine. Each of the shafts 7R to 19R inclusive and 7L to 19L inclusive terminate in a rotary coupling 27 which is connected by a flexible tubing 28 to a corresponding T fitting 29 in the headers 25 and 26, as shown.

Referring to FIGS. 1 and 2, a sprocket 30 is secured on each shaft 7L through 19L and three idler sprockets 31 are secured for rotation on shafts 32 retained by brackets 33 fixed on support 1. An endless roller chain 34 is meshed with all sprockets 30 and 31, as shown in FIG. 2, for simultaneously rotating all rolls in the directions shown.

Referring to FIG. 1, an electric motor 35 is positioned to rotate shaft 7L by means of drive sprocket 36, driven sprocket 37 and a chain 38.

It is now apparent that when the motor 35 is energized, all of the rolls will rotate in the directions indicated in FIG. 3 and with the necessary equal peripheral velocity, and that when manifold 25 is connected to a source of pressurized cooling water, the water will flow through the rolls for cooling same, while rotating, and be discharged from manifold 26.

It is also apparent that when a linear cloth 39 is threaded around the rolls, as shown in FIG. 3, it will follow a path indicated by the arrows at a speed determined by the rotation of motor 35.

It is customary to perform the singeing operation on cloth as it is unwound from large spools in the condition as received from the looms and following singeing, to deliver the cloth to a brushing machine for further treatment. Thus, it is apparent that the speed of the motor in the singeing machine must be matched with other power drive sources which deliver the cloth to or from the singeing machine.

Referring to FIGS. 1 and 3, a fuel feed pipe 40 is journaled for oscillation in supports 1 and 2 and the left hand end is closed by means of cap 41 and a coupling 42 on the right hand end of the pipe is connected to a conduit 43 connected to a source of gas fuel not shown. A pair of S shaped manifolds 44 are connected into pipe 40 by a cross coupling 45, as shown. A pair of parallel spaced linear burners 46 are coupled into the upper and lower end portions of each manifold, as shown.

The face of each burner is constructed as shown in FIG. 6 in which a plurality of staggered slots are formed by the parallel placement of lava blocks 47 which are retained along the slotted opening in the burner pipe by clamps 48—48.

When a pressurized mixture of gaseous fuel and air is introduced into burners 46, a plurality of flames may be ignited, as illustrated in FIG. 5, and when the burners are in active position, the multiple flames of the burners will closely impinge upon the cloth wrapped around each of the rolls 7, 9, 17 and 19. The fuel pipe 40 is adapted

for oscillation for moving the manifolds and the burners from position shown in full lines, FIG. 3, to a position shown in dotted lines for quickly removing the flame from the cloth carried by the rolls under emergency conditions hereinafter described. This movement is accomplished by a lever 49 fixed to pipe 40 and pivotally connected to a double acting air cylinder 50 by means of pin 51 and yoke 52 connected to the piston rod 53, better shown FIG. 2. The cylinder 50 is pivotally secured to upright 1 by bracket 54 and pin 55.

It is now apparent that when the cylinder 50 is energized into the position shown in solid lines, FIG. 3, the lower burners 46 will be positioned in close proximity to rolls 7 and 9 for singeing one side of the expanded cloth 39 and the upper burners 46 will be positioned in close proximity to rolls 17 and 19 for singeing the opposite expanded side of cloth 39.

When the cylinder 50 is energized in opposite direction, the pipe 40 will axially rotate and all burners 46 will be quickly moved a safe distance away from both the lower and upper rolls.

In this particular embodiment, the position of the burners is controlled by an electro-pneumatic means illustrated in FIG. 7 in which a relay 57 is normally energized from a source of power L_1-L_2 through closed switch 56. The cylinder 50 is operated by a self-restoring electro-magnetic valve means 58 connected to the cylinder 50 by conduits 60 and 61 and provided with a conduit 59 for connection to a source of compressed air and including an exhaust conduit 62, as shown. The valve means is connected to the single pole single throw switch of the relay, as shown, and normally is urged by internal spring means into one direction corresponding to the retracted position of the burners, thus providing automatic retraction of the burners in case of electric power failure. When the relay is energized, the valve will also be energized and the yoke 52 moved into full line position for holding the burners 46 in their singeing positions.

The switch 56 is commonly held closed by centrifugal governor 63, shown in FIG. 7 which may be, connected to a shaft 32 in the singeing machine or other machines moving the cloth, and is held closed by the inertial action of the governor when the cloth is moved at a predetermined normal linear velocity.

In the event of a reduction in the linear speed of the cloth or the momentary stoppage of same, the switch 56 will open and de-energize relay 57 permitting the opening of the contacts thereof to de-energize and operate the valve 58 and cylinder 50 and move the yoke 52 to position shown in dotted lines which in turn will move all burners a safe distance from the cloth on the rolls.

In operation and assuming that a linear cloth is threaded through the singeing machine, as shown in FIG. 3, and that the motor 35 is energized, the cloth will move in a direction shown by arrows by appropriate feed and take-up mechanisms, not shown, and also under the assumption that a cooling liquid is supplied to header 25, shown in FIG. 1, the liquid will flow through all rolls and be discharged from header 26.

When the conduit 43 is connected to a source of pressurized combustible gas, then each burner 46, when ignited, will supply the equivalent of a linear flame running the entire length of rolls 7 and 9 and 17 and 19 and this flame will decompose by singeing extraneous fibrous ends projecting from the cloth and positioned in the interstices between the threads of the cloth, and it is apparent that the cloth will be singed on both sides by being expanded in opposite directions in passing through the machine.

Because of the intimate contact of the cloth with the surface of all of the rolls which are maintained at a predetermined low temperature by the flow of cooling liquid, the relatively high temperature of the burner flame will decompose by singeing the fibrous ends of threads projecting from said cloth but will not injure the main body of the cloth by virtue of its linear velocity and the

rapid heat transfer from the flame and the cloth into the rolls.

It is to be noted that the rolls have a relatively small diameter, in the order of four inches, in order that the interstices between the weft threads of the cloth are expanded permitting the flame to singe thread fibers normally positioned in said interstices.

Certain modifications to the above construction, utilizing the features described, are intended to come within the scope of the appended claims.

Having described my invention, I claim:

1. A machine for singeing fibrous thread ends from cloth comprising a means forming a frame,
 - a plurality of hollow cylindrical rolls journaled for axial rotation in said frame with the axes thereof grouped in staggered parallel relation for transporting said cloth threaded thereon and simultaneously expanding one side thereof over a singeing one of said roll,
 - a power driven transmission means connected to said rolls constructed and adapted to rotate same at predetermined like peripheral velocity for transporting said cloth on said rolls at said velocity through said machine when energized,
 - independent rotatable coupling means connecting opposite ends of each of said rolls to independent fixed inlet and outlet headers respectively for conducting a coolant liquid through said rolls for cooling same when said inlet header is connected to a source of pressurized coolant liquid,
 - a burner means secured for movement in said frame from a singe position in close linear proximity to said singeing one of said rolls to a safe position spaced therefrom,
 - power means in said frame operatively articulated with said burner means for normally urging the latter into said safe position when de-energized,
 - a source of gas fuel connected to said burner means, said burner adapted to impinge a linear flame laterally against said cloth moving over and expanded on said singeing one of said rolls when said fuel is ignited and when said transmission is energized and said liquid is conducted through said rolls for decomposing said thread ends in and on one side of said cloth, said burner moving to said safe position when said power means is de-energized.
2. In a machine for singeing cloth of the character described a means forming a frame,
 - a plurality of cylindrical rolls journaled for axial rotation in said frame with the axes thereof in adjacent parallel relation for transporting said cloth threaded thereon over a singeing one of said rolls,
 - a power driven transmission means connected to said rolls constructed and adapted to rotate same at predetermined like peripheral velocity for transporting said cloth on said rolls at said velocity through said machine when energized,
 - a burner means secured for movement in said frame from a singe position in close linear proximity to said singeing one of said rolls to a safe position spaced therefrom,
 - power means in said frame operatively articulated with said burner means for moving the latter into said safe position when de-energized,
 - a source of energy for said power means,
 - a velocity sensitive control means associated with said machine responsive to a decrease in the said velocity of said cloth and connected to said source of energy and said power means adapted to de-energize the latter and move said burner means from said singe to said safe position when operated by the said decrease in the velocity of said cloth,
 - a source of gas fuel connected to said burner means, said burner means adapted to impinge a linear flame laterally against said cloth moving over and expanded on said singeing one of said rolls when said fuel is

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ignited and when said transmission is energized for singeing said cloth when said burner means are in said singe position and whereby a decrease in the said velocity of said cloth will move said burner means into said safe position.

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3. In a machine for singeing cloth of the character described a means forming a frame,
 - a plurality of cylindrical rolls journaled for axial rotation in said frame with the axes thereof in adjacent parallel relation for transporting said cloth threaded thereon over a singeing one of said rolls, 10
 - a power driven transmission means connected to said rolls constructed and adapted to rotate same at predetermined like peripheral velocity for transporting said cloth on said rolls at said velocity through said machine when energized, 15
 - a burner means secured for movement in said frame from a singe position in close linear proximity to said singeing one of said rolls to a safe position spaced therefrom, 20
 - fluid power means in said frame operatively articulated with said burner means for normally moving the latter into said safe position when de-energized,
 - a source of fluid power,
 - fluid control means connected to said power means and said source of power, 25
 - a source of electric energy,
 - electric switch means associated with said machine responsive to a decrease in the said velocity of said cloth, circuit means connected to said switch means and said control means and said source of electric energy whereby said burner means will singe said cloth when in said singe position and said transmission means is energized and whereby a decrease in the said velocity of said cloth will operate said switch means and said control means and move said burner means into said safe position. 30
4. In a machine for singeing cloth of the character described a means forming a frame, 40
 - a first plurality of cylindrical rolls journaled for axial rotation in said frame with the axes thereof grouped in staggered parallel relation for simultaneously transporting and expanding one side of said cloth

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- threaded thereon over a singeing one of said rolls,
- a second plurality of cylindrical rolls journaled for axial rotation in said frame with the axes thereof grouped in staggered parallel relation for simultaneously transporting and expanding the opposite side of said cloth threaded thereon over a singeing one of said rolls,
- each of said rolls having a coaxial passage there-through,
- a power driven transmission means connected to said first and second plurality of said rolls constructed and adapted to rotate same at predetermined like peripheral velocity for transporting said cloth on said rolls at said velocity through said machine when energized,
- a burner means secured for movement in said frame from a singeing position in close linear proximity to each of said singeing one of said rolls to a safe position therefrom,
- power means in said frame operatively articulated with said burner means for normally urging the latter into said safe position when de-energized,
- independent rotatable coupling means connecting opposite ends of each of said rolls to independent fixed inlet and outlet headers respectively for conducting a coolant liquid through said rolls for cooling same when said inlet header is connected to a source of pressurized coolant liquid.

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