

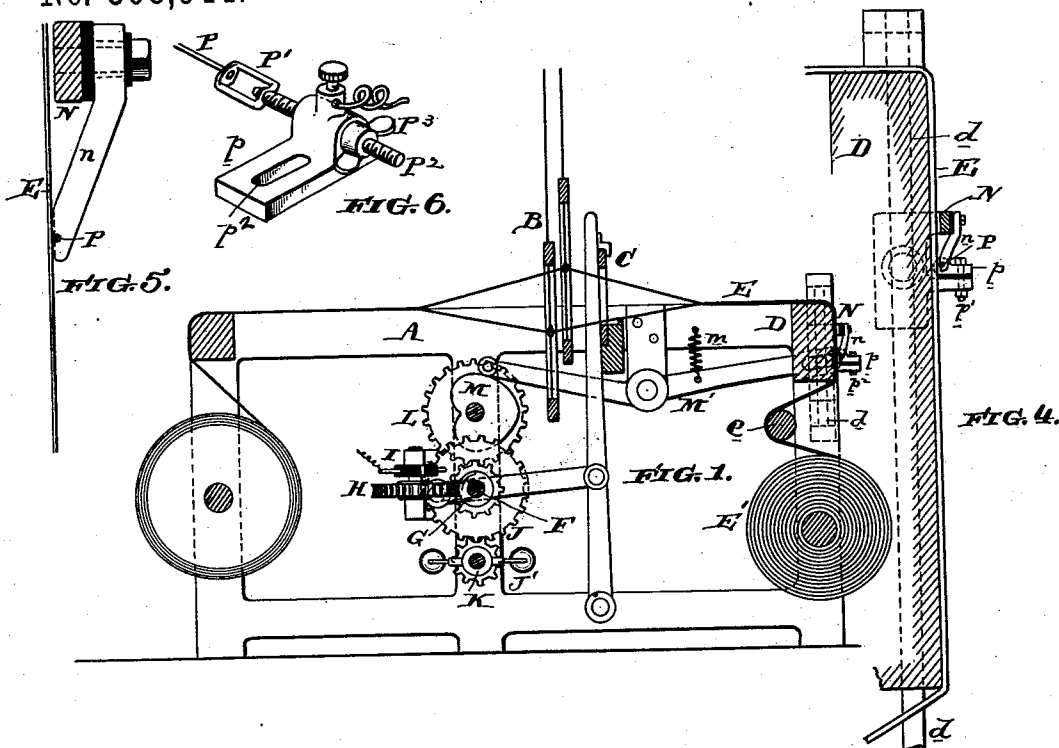
(No Model.)

2 Sheets—Sheet 1.

R. M. HUNTER.
DEVICE FOR SINGEING CLOTH.

No. 508,944.

Patented Nov. 21, 1893.



Witnesses:
L. J. Dwyer
S. J. Gieseler.

Inventor:

R. M. Hunter

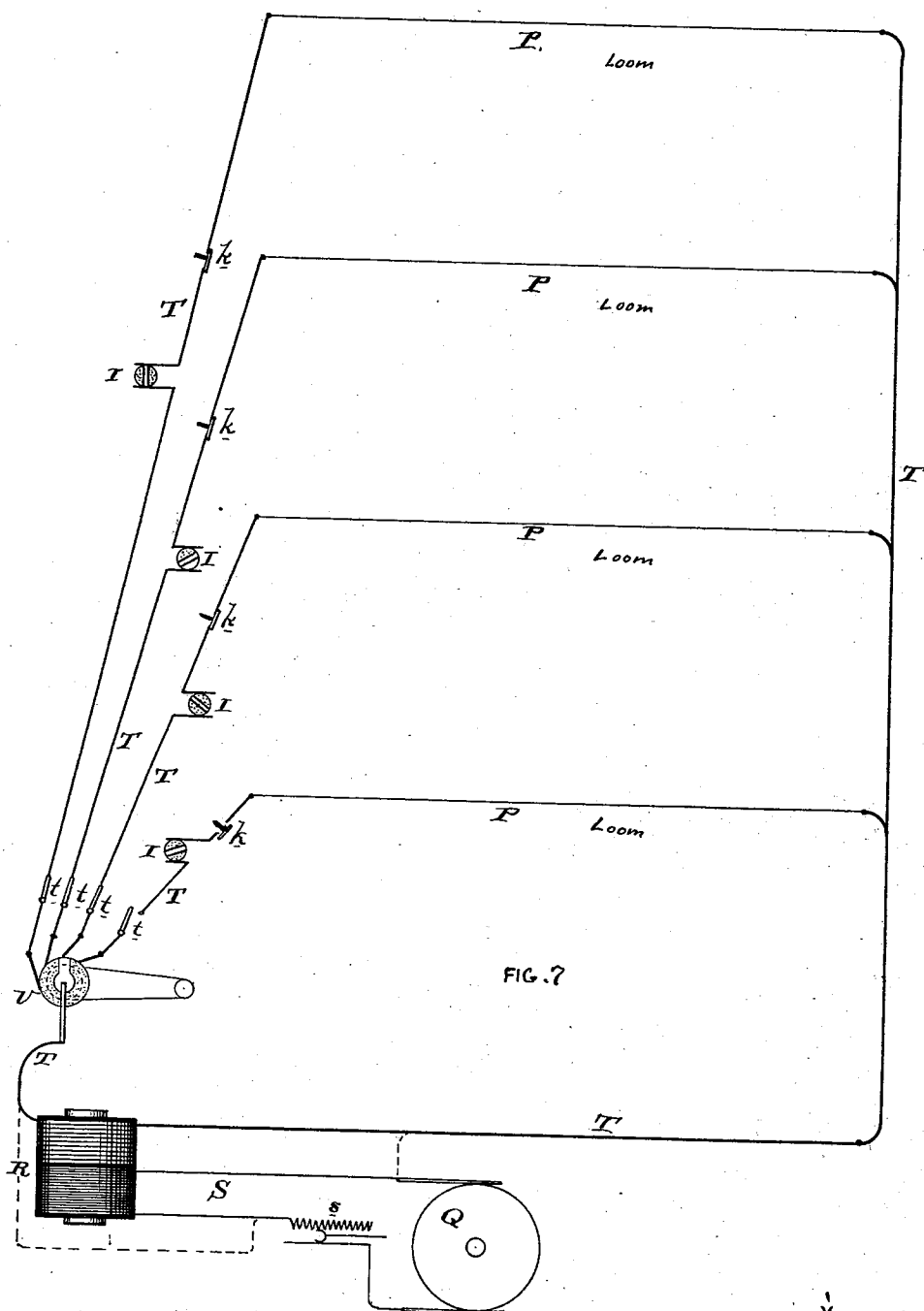
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2 Sheets—Sheet 2.

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Attest
Henry D. Dwyer
Jesse Heller

Inventor
R. M. Hunter

UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA.

DEVICE FOR SINGEING CLOTH.

SPECIFICATION forming part of Letters Patent No. 508,944, dated November 21, 1893.

Application filed July 16, 1890. Serial No. 358,882. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Devices for Singeing Cloth, of which the following is a specification.

My invention has reference to looms for weaving textile fabric, and more particularly to the application of electricity thereto for the purpose of removing the objectionable projecting fibers or pile surface; and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

In the manufacture of fabrics, such as ingrain carpets, the fabric as it leaves the loom, is formed with a surface more or less rough due to the mass of small projecting fibers which is the natural result of the weaving in the loom.

Heretofore it has been customary to subject the completed fabric after having been taken from the loom to a cutting or trimming machine having rapidly revolving knives which pass over the surface of the carpet or fabric and trim off all projecting fibers, leaving a clear and highly finished surface. In fabrics of a width of about one yard this can be accomplished with a fair degree of economy, but in the case of carpets or other fabrics having great width, such as ingrain rugs, it has been impracticable to subject them to treatment in mechanical cutting or trimming machines. No cutting or trimming machines have ever been made of sufficient size to take in a carpet of greater width than one yard, and if it were possible to make practical machines of sufficient size to take in the largest ingrain carpet rugs, it would not be economical to handle the carpets of such width in such a machine.

The object of my invention is to perform the trimming upon the loom during the process of manufacture of the carpet; and secondly, it is my object to utilize the heating effect of the electric current for singeing or burning off the extending fibers without injuring the body of the fabric.

My invention renders the trimming of wide carpets an easy matter, and one which is attended with great economy, for the operation

of the mechanism is automatic, and the function of trimming the carpet is carried on during the process of weaving, and immediately prior to the fabric being wound into the rolls for delivery.

In carrying out my invention I cause the carpet, after being woven, to pass in front of a beam, over which it is drawn tightly, and while passing over said beam an electric conductor, preferably drawn very tight, is caused to be moved back and forth in front of the surface of the carpet and very close to its face. During such movement of the electric conductor a current of electricity is caused to pass through it, raising it to incandescence, and thereby burning or singeing all the projecting fibers which may be found upon the face of the carpet. I prefer to cause the wire to be reciprocated constantly, and the current to flow through the said conducting wire at specified intervals, or after a given length of the carpet has been woven, such length being slightly less than the distance traveled by the electric conductor. I combine the switch mechanism for throwing the current on and off with the loom proper, and the mechanism for operating the conductor, so that the various parts in the loom work synchronously, and every portion of the carpet is treated properly to the singeing action of the electric conductor. If the conductor was constantly maintained at a high temperature there would be danger of burning the fabric and of the conductor becoming incapacitated for use owing to the constant sagging. I therefore prefer to pass the current intermittently through the conductor, which may, if desired, be continually reciprocated over the face of the carpet. The current which is supplied to the conducting wire is preferably of the alternating system, and may be of very low potential and large volume, and the source of electric energy may be a dynamo electric machine, whose circuit is in connection with the fine wire of the induction coil or secondary generator, whose coarse wire is in circuit with the singeing conductor.

Where a large number of looms are to be employed it would be objectionable to allow the current to pass promiscuously through the various singeing conductors of the several looms, because if said conductors were ar-

ranged in series the resistance would be too great for good effect, and all the looms would have to be in operation at one time, and if the conductors were arranged in parallel then too small an amount of current would pass through any conductor to give good practical effects with a given sized dynamo or primary generator having a capacity adapted to one machine. I therefore arrange the circuits of the several looms with the primary generator in such a manner that the current is thrown successively into the circuits of the several looms, and by this means I am enabled with a generator having a capacity for one singeing circuit to supply a current for the practical operation of a very large number of looms.

Another portion of my machine is to provide an automatic cut out whereby when the loom is stopped the electric current passing over the singeing wire is stopped by a rupture of the conducting circuit.

My invention comprehends many improvements, all of which are fully specified in the specification hereinafter, and illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of a loom embodying my invention. Fig. 2 is a front view of a portion of the loom. Fig. 3 is a diagram illustrating the arrangement of the circuits between the primary source of power and the singeing conductor. Fig. 4 is a vertical section of the upper right hand portion of Fig. 1 enlarged. Fig. 5 is a still further enlarged portion of the sustaining arm for the singeing conductor. Fig. 6 is a perspective view of the tension device for taking up the slack in the singeing conductor, and Fig. 7 is a diagram illustrating the arrangement of circuits when a number of looms are to be operated from the same source of electric power.

A is the frame of the machine, B are the heddles, C is the lay, and E is the fabric which has been woven. This fabric is passed over and down in front of a beam D, having a flat face, and of greater width than the width of the carpet being woven. After the carpet has left the beam D it passes back of the guide roller *e*, and is wound into the roll E'. The kind of loom is immaterial to my invention, and in place of heddles a Jacquard mechanism may be employed as in the case of ingrain carpet looms. Upon each side of the loom is a vertical guide *d*, upon which a frame N is reciprocated vertically by means of levers M', which are pulled in one direction by springs *m*, and moved in the other direction by a cam M, made preferably heart shaped, but which may be of any other suitable construction if so desired.

F is the main shaft of the loom and operates the lay C by means of suitable cranks, as is well known. The cam M is caused to rotate with a speed commensurate with the rotation of the power shaft F by means of gearing L.

I is a circuit breaker and maker, and is rotated by means of a worm wheel H, and worm G upon the power shaft F.

K is a governor which is rotated by means of gearing J J' connecting with the power shaft of the loom, the said governor operating a switch *k*.

P is the singeing wire, which is stretched upon the frame N close to but not touching the face of the fabric E.

Referring to Fig. 3 it will be seen that this wire P includes a circuit T, and the circuit maker and breaker I, the coarse wire of the induction coil R and the circuit interrupter or hand switch *t*.

Q is the generator of electricity, and is in circuit with the fine wire of the induction coil R by means of conductors S, which include the resistance changer or circuit controller *s*. The generator Q may be kept constantly in motion, and whether the incandescence conductor P becomes heated or not depends upon the hand switch *t*, the circuit maker and breaker I and switch *k*. If the machine is at rest and the circuit maker and breaker I is in such position as to close the circuit T, then the switch *k* will be automatically opened, and no current would flow through the incandescence conductor. If on the other hand the loom was in motion, and it was desired to stop the flow of electricity through the incandescence conductor the switch *t* may be opened.

The coarse wire of the induction coil R is connected in the circuit T, while the fine wire of said induction coil is connected by the circuit S with the primary generator Q preferably for generating alternating current.

The generator Q may be constantly operated irrespective of whether the circuit T P is open or closed, and the high potential currents from the generator Q are converted into low potential currents, and transmitted over the circuit T and singeing conductor P. During the operation of the loom every time a given length of carpet is woven, and is arranged upon the face of the beam D, the current in the circuit T is thrown onto the wire P during the time said wire makes one movement over the face of the fabric, and then the current is cut off again until a new length of the fabric is woven. It is evident that the current may pass over the singeing wire during more than one movement of the said singeing wire over the face of the fabric if desired.

The singeing wire P is clamped at one end in a bracket *p*, and is connected at the other end with a take up device, carried by a similar bracket *p*, said brackets being bolted to the vertically reciprocating frame N, which is guided upon the vertical guide rods *d*. The take up device for the singeing wire is clearly shown in Fig. 6, wherein the wire P is connected to a swivel P', which in turn is connected to a tension screw P², passing through the bracket *p*, and adjusted by means of a

nut P³. The brackets *p* are insulated from the frame M, and are clamped thereto by means of bolts *p'*, passing through slotted holes *p*² in the said brackets. By this means the singeing wire may be adjusted to or from the face of the carpet.

As my invention contemplates the using of electricity for the purpose herein described on looms weaving very wide carpets, it is necessary to provide some means for preventing the singeing wire from sagging when it is heated. To accomplish this I provide the support *n*, which is bolted to the frame N at the middle, and extends obliquely downwardly toward the carpet, and carries at its lower end the singeing wire P, as is clearly shown in Fig. 5. If desired this arm N may rest against the face of the carpet, or said arm may be cut off, so as to leave a small air space between it and the carpet, as is indicated by dotted lines in Fig. 5, and as is clearly shown in Fig. 4. It is quite evident that any number of these supports may be employed across the width of the loom, but I have only shown one such support in the drawings, as illustrating the principles of my improvement. By using a sufficient number of these supports *n* the singeing wire may be of any length desired, and can readily be used in large looms, or those having a capacity for weaving carpet of ten to one hundred feet in width. The brackets *p* and arm *n* are insulated from the frame N so as not to form short circuits for the current around the singeing wire P, with which they are in mechanical contact.

It is quite evident that the details for supporting the singeing wire may be greatly modified without in the least departing from the spirit of my invention. It is also evident that my improved mechanism may be used upon machines not especially adapted to weave carpet, but where the carpet is caused to travel over a beam, such as D, for the sole purpose of being treated to the electric singeing operation.

While I have spoken of carpets as the fabric for which my invention is especially intended, it is to be understood that I do not confine myself to a loom or machine for weaving or treating any special kind of fabric.

Referring to Fig. 7, I have a series of singeing wires P corresponding to different looms, which have their circuits T each provided with a switch *t*. The circuits T leading from one end of the singeing wire pass to brushes, resting against a rotating circuit maker and breaker U, which may be rotated by the dynamo electric machine, or any suitable convenient means. The switch is connected with the other ends of the singeing wires P through the coarse wire of the induction coil R, the fine wire of which is in the circuit S, having the primary generator Q. It will now be observed that as the switch U is rotated it throws all the current at any one moment into one of the singeing wires P, and one alone, the remaining ones being out of circuit for

that interval. If this switch U should be revolved very rapidly, short impulses of current will be thrown successively over the various singeing wires, and would be thrown in such rapid succession as to maintain them in a heated condition during the time they are kept closed by the circuit maker and breaker switch I.

While I have shown induction coils as the direct means of supplying the singeing wire circuit with the proper electric current it is to be understood that I do not confine myself thereto as the current may be supplied directly from a dynamo electric machine as indicated in dotted lines in Fig. 7.

While I prefer the general constructions herein set out I do not limit myself to the details thereof as they may be modified in various ways without departing from the spirit of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a loom, of a guide over which a fabric is moved, devices for weaving the fabric located on one side of the guide, a fabric receiving cylinder or drum on the other side of the guide, a reciprocating singeing wire movable in a plane and direction parallel to the moving fabric passing about the guide, and a source of electric energy for raising the singeing wire to incandescence.

2. The combination of a guide over which a fabric is moved, with a movable singeing wire, a source of electrical energy for raising the singeing wire to incandescence, power mechanism for reciprocating the movable singeing wire back and forth over the surface of the fabric, and a circuit controlling device for intermittently closing the circuit to cause the current to pass through the singeing wire at intervals.

3. The combination of guides over which the fabric is passed, a reciprocating frame adapted to reciprocate in a direction corresponding to the travel of the fabric, common power devices for feeding the fabric and reciprocating the reciprocating frame, a singeing wire carried by the reciprocating frame parallel to the fabric and stretched transversely to the direction of its movement, one or more supports carried by the reciprocating frame between the ends of the singeing wire and to which the said wire is connected to support it against sagging, electrical circuits for supplying currents to the singeing wire, and a source of electrical energy connecting with the electrical circuits.

4. The combination of a guide over which fabric is stretched, a reciprocating frame, a singeing wire carried by said frame, one or more supports carried by the frame between the ends of the singeing wire for supporting it against sagging, a source of electrical energy, a circuit for supplying current from said source of electrical energy to the singeing

ing wire, power mechanism for reciprocating the frame and the singeing wire over the surface of the fabric, and a circuit controller operated by said power mechanism for causing the current to flow through the singeing wire at stated intervals.

5. The combination of a guide over which fabric is stretched, a reciprocating frame, a singeing wire carried by said frame, one or more supports carried by the frame between the ends of the singeing wire for supporting it against sagging, a source of electrical energy, a circuit for supplying current from said source of electrical energy to the singeing wire, power mechanism for reciprocating the frame and the singeing wire over the surface of the fabric, a circuit controller operated by said power mechanism for causing the current to flow through the singeing wire at stated intervals, and a cut out or circuit interrupting device also actuated by the power mechanism to interrupt the current through the singeing wire in case the operation of the power mechanism should become stopped.

6. The combination of a loom having a beam or guide over which the fabric is passed, a reciprocating frame actuated by the power mechanism of the loom, a singeing wire carried by the reciprocating frame and moved in substantially uniform and close proximity to and in the direction of travel of the fabric as it passes over the beam or guide immediately after being woven, a source of electrical energy, and a circuit controlling device for controlling the current flowing through the singeing wire whereby the singeing wire may be raised to incandescence at intervals.

7. The combination of a loom having a beam or guide over which the fabric is passed, a reciprocating frame actuated by the power mechanism of the loom, a singeing wire carried by the reciprocating frame and moved in substantially uniform and close proximity to and in the direction of travel of the fabric as it passes over the beam or guide immediately after being woven, a source of electrical energy, and a constantly moving circuit controlling device operated by the power mechanism of the loom for controlling the current flowing through the singeing wire whereby the singeing wire may be raised to incandescence at intervals.

8. The combination of a loom having a beam or guide over which the fabric is passed, a reciprocating frame actuated by the power mechanism of the loom, a singeing wire carried by the reciprocating frame and moved in close proximity to the fabric as it passes over the beam or guide, a source of electrical energy, a circuit controlling device operated by the power mechanism of the loom for controlling the current flowing through the singeing wire whereby the singeing wire may be raised to incandescence at intervals, and an automatic circuit breaking apparatus for interrupting the flow of the current through the

singeing wire in case the loom should stop its operation.

9. The combination of a loom having a beam or guide over which the fabric is passed, a reciprocating frame actuated by the power mechanism of the loom, a singeing wire carried by the reciprocating frame and moved in close proximity to the fabric as it passes over the beam or guide, a source of electrical energy, a circuit controlling device for controlling the current flowing through the singeing wire whereby the singeing wire may be raised to incandescence at intervals, and an automatic circuit breaking apparatus for interrupting the flow of the current through the singeing wire in case the loom should stop its operation.

10. The combination of a loom for weaving a fabric provided with guiding surfaces over which the fabric is moved, a reciprocating frame carried by the frame of the loom and movable in a direction corresponding to the direction of the movement of the fabric, a singeing wire connected to said reciprocating frame, tightening devices for stretching the singeing wire to eliminate all slack due to elongation, and power devices operated by the power devices of the loom for reciprocating the said reciprocating frame commensurate with the speed of operation of the loom.

11. The combination of a guide over which a fabric is moved, a reciprocating frame movable over and parallel with the surface of the fabric, a singeing wire carried by said frame and moved over the face of the fabric, supports for the singeing wire carried by the frame at the ends and intermediate portions of the said singeing wire, and a tension device to take up all slack in the singeing wire and maintain it straight.

12. The combination of a guide over which a fabric is moved, a reciprocating frame movable over and parallel with the surface of the fabric, a singeing wire carried by said frame and moved parallel to the face of the fabric, supports for the singeing wire carried by the frame at the ends and intermediate portions of the said singeing wire, a tension device to take up all slack in the singeing wire and maintain it straight, a source of electrical energy for supplying electric current to the said singeing wire, and a current controlling device for controlling the current flowing through the said singeing wire.

13. The combination of a guide over which a fabric is moved, a movable frame, a singeing wire carried by the movable frame and moved in a direction corresponding to the travel of and over and parallel to the surface of the fabric while being guided by the guides therefor, a source of electrical energy to energize the singeing wire, and means to adjust the singeing wire upon the movable frame to and from the fabric.

14. The combination of a guide over which

a fabric is moved, a movable frame, a singeing wire carried by the movable frame and moved over the surface of the fabric while being guided by the guides therefor, a source of electrical energy to energize the singeing wire, means to adjust the singeing wire upon the movable frame to and from the fabric, power mechanism for reciprocating the movable frame, and a circuit controlling device actuated by the power mechanism to cause the electric current to flow through the singeing wire at stated intervals.

15. The combination of a guide over which a fabric is moved, a movable frame, a singeing wire carried by the movable frame and moved over the surface of the fabric while being guided by the guides therefor, a source of electrical energy to energize the singeing wire, means to adjust the singeing wire upon the movable frame to and from the fabric, power mechanism for reciprocating the movable frame, a circuit controlling device actuated by the power mechanism to cause the electric current to flow through the singeing wire at stated intervals, and an automatic cut out mechanism for cutting the singeing wire out of circuit with the source of electrical energy upon an interruption of the operation of the power mechanism.

16. The combination of a guide over which the fabric is stretched, a singeing wire movable over the surface of the fabric, power mechanism to move the singeing wire, an induction coil having its coarse wire coupled in circuit with the singeing wire, and an alternating current or primary generator having its poles coupled with the fine wire of the induction coil.

17. The combination of a guide over which the fabric is stretched, a singeing wire movable over the surface of the fabric, power mechanism to move the singeing wire, an induction coil having its coarse wire coupled in circuit with the singeing wire, an alternating current or primary generator having its poles coupled with the fine wire of the induction coil, and a circuit closing device for controlling the singeing wire circuit independently of the circuit of the alternating current or primary generator.

18. The combination of a guide over which the fabric is stretched, a singeing wire movable over the surface of the fabric, power mechanism to move the singeing wire, an induction coil having its coarse wire coupled in circuit with the singeing wire, an alternating current or primary generator having its poles coupled with the fine wire of the induction coil, a circuit closing device for controlling the singeing wire circuit independently of the circuit of the alternating current or primary generator, and means to control the current in the fine wire of the induction coil.

19. The combination of a guide over which the fabric is stretched, a singeing wire or conductor held in close relation with respect to

the surface of the fabric, an induction coil having its coarse wire connected in circuit with the singeing wire, and a primary generating apparatus of alternating currents coupled with the fine wire coil of the induction coil.

20. The combination of a guide over which the fabric is stretched, a singeing wire or conductor held in close relation with respect to the surface of the fabric, an induction coil having its coarse wire connected in circuit with the singeing wire, a primary generating apparatus of alternating currents coupled with the fine wire of the induction coil, and means to interrupt the current flowing through the singeing wire at intervals.

21. The combination of a guide over which the fabric is stretched, a singeing wire or conductor held in close relation with respect to the surface of the fabric, an induction coil having its coarse wire connected in circuit with the singeing wire, a primary generating apparatus of alternating currents coupled with the fine wire coil of the induction coil, means to interrupt the current flowing through the singeing wire at intervals, and means to control the current flowing through the fine wire of the induction coil independently of the means for controlling the current flowing in the singeing wire circuit.

22. The combination in a loom of a fixed guide over which the fabric is moved, a movable frame moving in guides and carrying a transverse conductor whereby the conductor is arranged to extend across and close to the face of the fabric, and remain at all times at a uniform distance from it, a source of electrical energy for raising the conductor to incandescence, and a switch device for controlling the current flowing through said conductor.

23. The combination of a series of guides for fabrics, a series of singeing wires therefor, a source of electrical energy, common to all of said singeing wires, and circuit controlling devices for successively causing the energizing current to flow over the respective singeing wires.

24. The combination of a series of guides for fabrics, a series of singeing wires therefor, a source of electrical energy common to all of said singeing wires, circuit controlling devices for successively causing the energizing current to flow over the respective singeing wires, and interrupting mechanism for interrupting the circuit through any singeing wire independently of the others.

25. The combination of a series of guides for fabrics, a series of singeing wires therefor, a source of electrical energy common to all of said singeing wires, circuit controlling devices for successively causing the energizing current to flow over the respective wires, interrupting mechanism for interrupting the circuit through any singeing wire independently of the others, and automatic circuit clos-

ing devices for closing the circuit through the separate singeing wires independently of each other.

26. The combination of a series of guide devices for fabrics, a series of singeing wires therefor, a source of electrical energy common to all of said singeing wires, separate circuits from the respective singeing wires to the source of electrical energy, and switch mechanism for throwing the current successively

in the circuit of the several singeing wires whereby a small generator of electrical energy may be utilized for energizing a large number of singeing wires.

In testimony of which invention I have hereunto set my hand.

R. M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,
S. T. YERKES.