

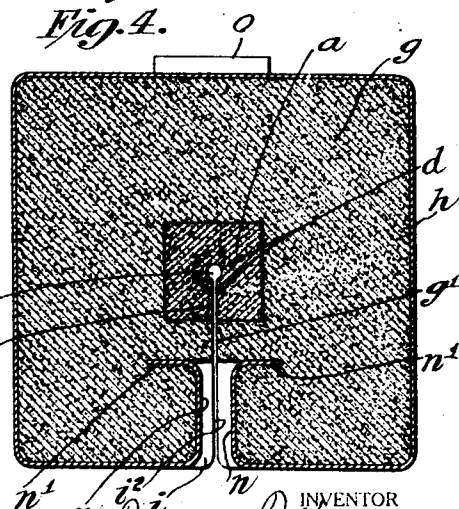
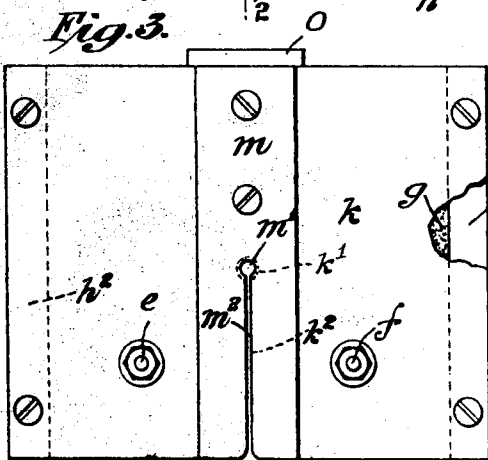
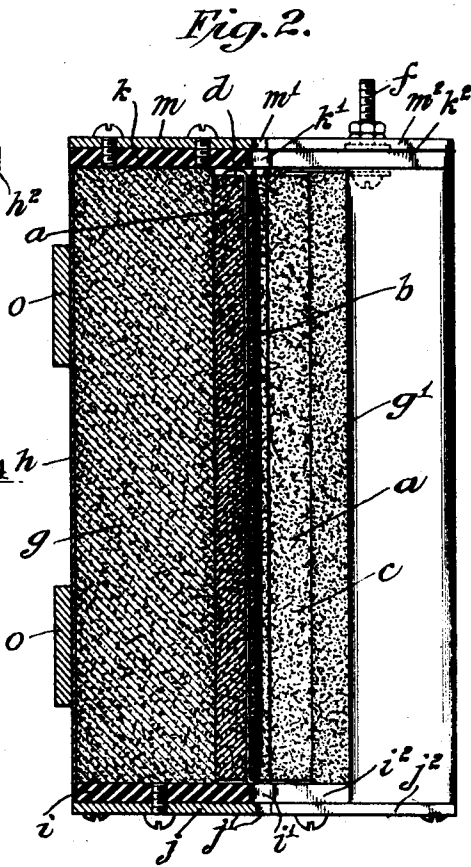
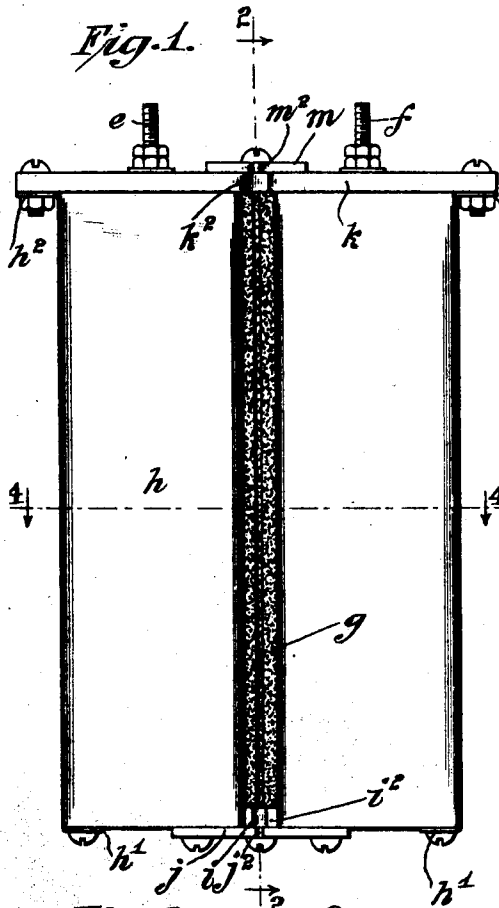
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T. F. HUSSA

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SINGING MACHINE

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UNITED STATES PATENT OFFICE

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SINGEING MACHINE

Application filed May 21, 1926. Serial No. 110,595.

My invention relates to singeing machines, and more particularly to singeing units for use upon machines for singeing threads and yarns of various materials.

Heretofore in the singeing of threads or yarn of cotton, wool or other materials, it has been the practice to pass them at high speed closely adjacent a gas flame heated unit or a troughed electrical resistance device, said electrical resistance device having superseded in large measure the use of the gas flame heated unit for singeing purposes.

With troughed singeing units of the character above referred to, with practically all grades of yarn, it has been found necessary to run the yarn through the singeing machine two or more times in order to thoroughly remove the surface fluff therefrom. This is true particularly as to the coarser grades of yarn. This condition arises from the fact that with an open troughed unit, different portions of the surface of the yarn are differently spaced with relation to the incandescent element, and portions thereof are protected from the action of the radiant energy by the body of the yarn itself. To overcome this difficulty as much as possible, it has been the practice to cut down the speed of the yarn to that which will give the best results, and to increase the electro-motive force.

The slow speeds of the yarn in singeing, and the subjecting of it more than once to the action of the singeing element have the effect of darkening the yarn somewhat, and also of an additional cost in the singeing operation, arising from either a low output of the machine or a re-handling of the yarns.

The electrical resistance singeing units also require in a machine, a bus bar construction which is expensive to install, and complicates the design of the machine.

With the above conditions in mind, I have provided a singeing machine embodying therein singeing units of a construction which will admit of the economical development and maintenance of the high temperatures necessary to effect the rapid singeing of threads or yarns with a single run of the same at much higher speeds than is pos-

sible with the older types of singeing units.

The construction of this unit is such as to not only permit of a very much increased output, but to act with substantial uniformity about all portions of the surface of the thread or yarn without any substantial variation in temperature conditions. The element may be operated at lower wattage than the ordinary electrical resistance units, the heat being so distributed, and the unit so insulated against heat radiation, as to ensure a continuous, substantially uniform incandescence throughout the operative surface of the element, thus securing a more effective singeing action.

Furthermore, with a lower wattage, the length of the singeing unit may be materially increased, thus not only securing the advantage of a longer run of the yarn while subjected to the singeing element, but a more effective application of radiant energy to the yarn, both of which factors permit of an increased speed in the travel of the yarn.

In a singeing machine embodying units of my invention, the range as to the counts of yarns which may be singed therein, is very much increased.

The unit is so formed as to permit the convenient and rapid insertion of the yarn without likelihood of separating the same by burning.

A unit embodying my invention may be assembled in the machine, and the electrical connections made without the use of bus bars of any kind, the use of insulated wires in making the connections, and of a heat insulating jacket, introducing safety factors in the machine.

The singeing element itself may be quickly removed from a unit, and a replacement element substituted therefor without removing the unit from the machine, or disturbing the heat insulating jacket.

The invention consists primarily in a singeing machine having a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small substantially circular opening extending longitudinally therethrough and a slot communicating with

said opening throughout the entire length thereof, and an electrical resistance element imbedded in the material of said block about and closely adjacent the wall of said longitudinally extending opening, whereby the material of said block may be brought to, and maintained in, an incandescent state; and in such other novel features and characteristics, all as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a front elevation of a singeing unit of a singeing machine embodying my invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a plan view; and

Fig. 4 is a section on the line 4—4 of Fig. 1.

Like letters refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawings, *a* indicates a block of material having high electrical resistance and low heat conductivity, such as aluminum oxide, which material, given merely by way of example, may be readily brought to an incandescent state and maintained in this state. Extending longitudinally through this block is a more or less circular opening *b*, and leading from this opening through the entire length of the block, is a slot *c* through which the thread or yarn may be inserted to within the opening *b*.

In the accompanying drawings, the block *a* is shown as being rectangular in horizontal cross section, but this is immaterial to the invention, it being merely a matter of manufacturing convenience.

Imbedded in the material of the block *a*, is an electrical resistance element *d*, preferably consisting of a nickel chromium alloy wire, looped through the material of the block *a*, portions of each loop extending substantially parallel with, and the various loops being grouped about the longitudinal opening *b* therethrough, and in fairly close proximity thereto. One end of the wire *d* is secured to a binding post *e*, and the other end thereof to a binding post *f*, which binding posts respectively are adapted to be connected, by means of ordinary insulated wires, with any desired electrical source.

The block *a* is surrounded by a mass *g* of ordinary heat insulating materials, such as fire clay, said block having a free sliding fit in an opening in this clay in order to permit the removal and replacement of the element in the unit.

The heat insulation *g* with the contained block *a*, is mounted within a metallic casing *h*, provided with inturned bottom flanges *h2*, the former of which serve as a support for an insulating slab *i* upon which the block *a* and the body of heat insulation *g*, rest. This insulating

sheet *i* is reinforced by a metallic bottom plate *j*, secured thereto by means of screws as shown. Said bottom plate *j* has therein a substantially circular opening *j'* in alinement with the longitudinally extending opening *b* in the block *a*, and a slot *j2* registering with the slot *c* in said block. The insulating strip *i* also has a substantially circular opening *i'* therein leading from which is a slot *i2*, the openings *i'* and slot *i2* registering with the openings *b* and *j'* and the slots *c* and *j2* respectively.

Secured to the outturned flanges *h2* is a sheet *k* of insulating material, having therein an opening *k'* and slot *k2* registering with the opening *b* and slot *c* respectively, this insulation *k* having secured thereto a reinforcing metallic plate *m* which also has an opening *m'* and slot *m2*, registering respectively with the openings *k'* and slot *k2*, and the other openings and slots in the block *a*, the sheet *i* of insulation and the reinforcing plate *j*. The slabs *i—k* are preferably made of asbestos.

The metallic casing *h* is provided with inturned and offset edges, as indicated at *n—n'*, adjacent the slots *c*, *i*, *j*, and *k* for supporting the body of heat insulation adjacent these slots, and facilitating the insertion of a thread or yarn through said slots to within the openings *b*. The various slots, at the bend of the inturned edges *n—n'*, have rounded entrances as shown, to facilitate the insertion of the thread or yarn.

At *o* I have indicated blocks secured to the casing *h* by means of which it may be mounted with relation to the mechanism for feeding thread or yarn therethrough.

The binding posts *e* and *f* are carried by the sheet *k* of insulating material.

The inturned portions *n* of the casing *h*, are spaced away from each other a distance considerably greater than the width of the slots *j2*, *i2*, *k2* and *m2*, and the offset edges *n'* are used for anchoring the casing *h* to the heat insulating body *g*, a considerable mass of said insulating material being positioned between these edges *n'* and the block *a*. The portion of the heat insulating body *g* intermediate the inturned edges *n'* and the block *a* is provided with a slot *g'* registering with the slot *c* and the slots *i2*, *j2*, *k2* and *m2*.

The operation of the herein described device is substantially as follows:—

A plurality of singeing units are mounted intermediate the supply and rewind mechanisms of a singeing machine, and the binding posts *e* and *f* of different units connected, by means of ordinary insulated conductor wires, with a source of electricity, the electrical conditions being such that each unit will have impressed thereon a current of from 15 to 17 volts, the capacity of the resistance element *d* being such as to utilize with this voltage a current density of from 13 to 15 amperes.

With this E. M. F., an increased efficiency of approximately twenty-five percent may be secured as compared with an ordinary troughed metallic electro resistance element, notwithstanding that the block *a* will be twenty percent longer than such a troughed element.

As the resistance element *d* becomes incandescent, it slowly transmits heat to the material of the block *a*, and this block, particularly closely adjacent the vertically extending opening *b*, will soon reach a high degree of radiance, and will retain this heat in part because of the low heat conductivity of the material of the block and in part because of the heavy envelope of fire-clay or other heat insulating material.

When the element *a* is properly heated, and the singeing machine is in operation, an operator merely snaps the thread or yarn through the slots *c*, *i*2, *j*2, *k*2 and *m*2, the pull upon the thread or yarn from the rewind mechanism bringing this thread in substantially axial alinement with the circular openings *b*, *i'*, *j'*, *k'* and *m'*, the speed of the thread avoiding the presence of any such slack as will cause it to contact with the walls of the opening *b* in a manner which will cause its breakage through charring thereof.

When the thread or yarn is thus properly positioned in each singeing unit, the operation of the machine may be continued without likelihood of the thread or yarn contacting with the incandescent walls about the opening *b*.

Since the opening *b* is substantially circular, with the exception of the small portion thereof where the slot *c* enters, it is apparent that substantially every portion of the yarn will be the same distance from the incandescent surface of the opening *b*, so that the entire surface of the yarn will be acted upon when passing through the resistance block *a*, thus requiring only a single run of the yarn to complete the singeing operation.

I have found in actual practice that with a unit embodying the invention, the charred fluff does not interfere with the singeing operation, without the use of an air circulation through the opening *b*, although if desired air may be so circulated without impairing the efficiency of the block *a* materially, since this air will have no tendency to dull or dampen the incandescent surface to an extent to interfere with the singeing operation.

In a singeing machine utilizing units embodying the invention, a speed of 1000 to 1200 feet per minute may be developed without difficulty, which is due in part to the increased length of the block *a* and in part to the construction of this block in a manner to conserve the heat developed by the electrical resistance element.

I have also found by actual experience that

the same units may be readily used with coarse or fine counts of yarn, and that with the coarse counts there is an increased efficiency of eighty-one percent as compared with gas heated units, this efficiency with the finer counts, however, amounting to only about thirty percent increase. I have also found in actual practice that there is substantially no appreciable darkening of the yarn as in gas heated singeing units.

From the foregoing, it is apparent that a singeing machine in which singeing units embodying the invention are used, has a marked increase in efficiency as compared with the troughed metallic resistance units and the gas heated units, not only because of the possibility of completely singeing the yarn with one run thereof, but because of the increased speed at which the yarn may be run through the unit and the lower consumption of electricity. The complete envelopment of the resistance element *d* by the material of the block *a* minimizes likelihood of varying degrees of incandescence at the surface of the longitudinally extending opening *b* because of the low heat conductivity of the material of the block *a* closely adjacent the walls of said opening.

It is not my intention to limit the invention to the precise details of construction shown in the drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small substantially circular opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block about and closely adjacent the wall of said longitudinally extending opening, whereby the material of said block may be brought to, and maintained in, an incandescent state, and an envelope of heat insulating material for said block, said insulating material having an opening therein adapted to receive said block, whereby said block is separable from said insulating material.

2. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block, whereby the material of said block may be brought to, and maintained in, an incandescent state, an en-

velope of heat insulating material for said block, said insulating material having an opening therein adapted to receive said block, whereby said block is separable from said insulating material, sheets of material non-conductive of electricity and heat at the top and bottom of said block and said envelope, and means securing said sheets in relation to said block and said envelope.

3. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block, whereby the material of said block may be brought to, and maintained in, an incandescent state, an envelope of heat insulating material for said block, a metallic casing enclosing said insulating envelope, and asbestos sheets at the top and at the bottom of said casing, said insulating sheets having openings therethrough registering with the longitudinally extending opening in said block, said casing and said sheets having slots therein registering with the slots in said block.

4. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block, whereby the material of said block may be brought to, and maintained in, an incandescent state, an envelope of heat insulating material for said block, said insulating material having an opening therein adapted to receive said block, whereby said block is separable from said insulating material, sheets of material non-conductive of electricity and heat at the top and bottom of said block and said envelope, means securing said sheets in relation to said block and said envelope, and binding posts carried by the top sheet of electro and heat non-conductive material electrically connected with said electrical resistance element.

5. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block, whereby the material of said block may be brought to, and maintained in, an incandescent state, an envelope of heat insulating material for said block, said insulating material having

an opening therein adapted to receive said block, whereby said block is separable from said insulating material, sheets of material non-conductive of electricity and heat at the top and bottom of said block and said envelope, and having openings and slots registering with the opening and the slot in said block, metallic reinforcements secured to said sheets adjacent the openings and the slots therein, said reinforcements also having openings and slots therein registering with the other openings and slots, and means securing said sheets in relation to said block and said envelope.

6. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block, whereby the material of said block may be brought to, and maintained in, an incandescent state, an envelope of heat insulating material for said block, a metallic casing enclosing said insulating envelope having intumed bottom flanges and outturned top flanges, and asbestos sheets at the top and at the bottom of said casing supported by said top and said bottom flanges respectively, said insulating sheets having openings therethrough registering with the longitudinally extending opening in said block, said casing and said sheets having slots therein registering with the slots in said block.

7. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, an electrical resistance element imbedded in the material of said block, whereby the material of said block may be brought to, and maintained in, an incandescent state, an envelope of heat insulating material for said block, a metallic casing enclosing said insulating envelope having intumed bottom flanges and outturned top flanges, asbestos sheets at the top and at the bottom of said casing supported by said top and said bottom flanges respectively, said insulating sheets having openings therethrough registering with the longitudinally extending opening in said block, said casing and said sheets having slots therein registering with the slots in said block, reinforcing metallic plates adjacent the openings and slots in said sheets, said reinforcing plates having openings and slots therein registering with the other openings and slots, and binding posts carried by the

top sheet and electrically connected with said electrical resistance element.

8. In a singeing machine, a singeing unit embodying therein a block of material having high electrical resistance and low heat conductivity, said block having a small substantially circular opening extending longitudinally therethrough and a slot communicating with said opening throughout the entire length thereof, and an electrical resistance element consisting of a wire looped through the material of said block, portions of each loop extending substantially parallel with, and being grouped about and adjacent the wall of the longitudinally extending opening in said block, whereby the material of said block may be brought to, and maintained in, an incandescent state particularly adjacent the wall of said longitudinally extending opening.

In witness whereof, I have hereunto affixed my signature this 17th day of May, 1926.

THEODORE F. HUSSA.

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