C. J. BEAVER, J. STRATTON AND E. A. CLAREMONT.

LAPPING MACHINE FOR COVERING ELECTRIC CONDUCTORS.

APPLICATION FILED JUNE 24, 1919.

1,330,050. Patented Feb. 10, 1920.

2 SHEETS—SHEET 1.

Fig. 1

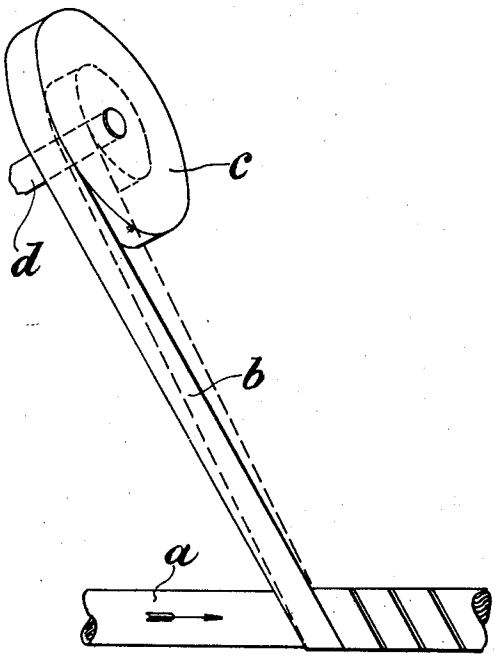
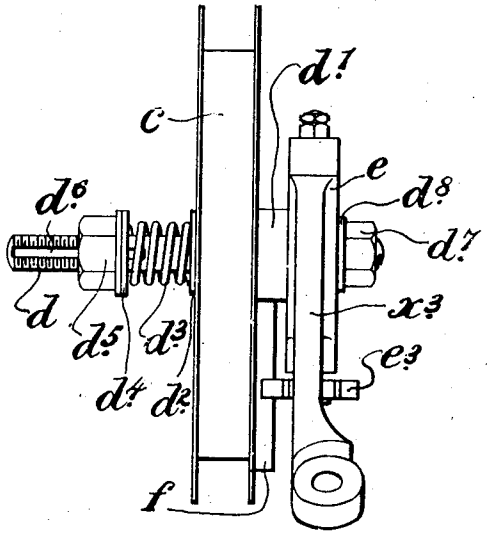


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 2

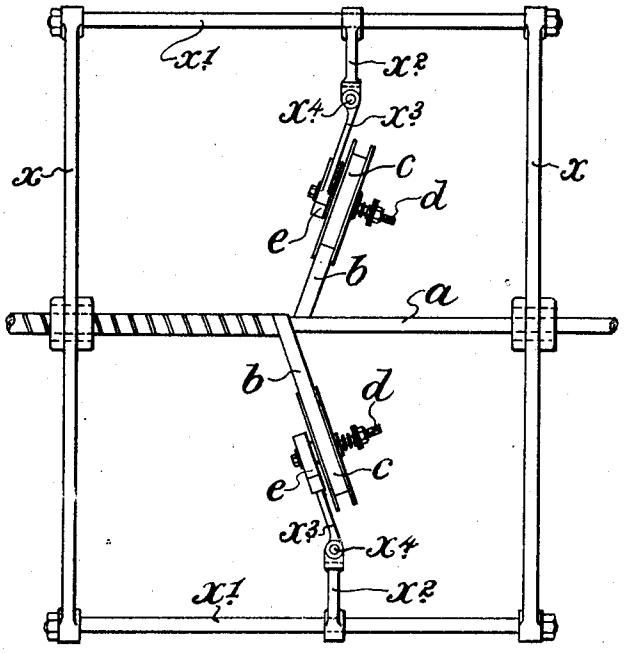


Fig. 5

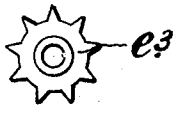
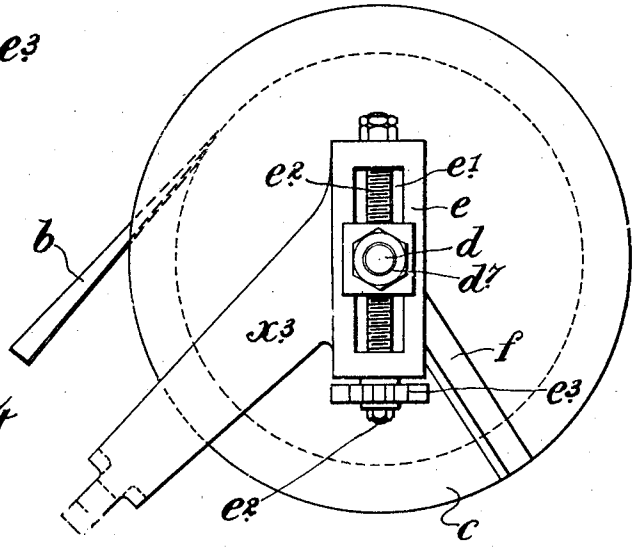


Fig. 4



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UNITED STATES PATENT OFFICE.

CHARLES JAMES BEAVER, OF HALE, JOHN STRATTON, OF ROWDON, AND ERNEST ALEXANDER CLAREMONT, OF HIGH LEGH, ENGLAND.

LAPPING-MACHINE FOR COVERING ELECTRIC CONDUCTORS.

1,330,050. Specification of Letters Patent. Patented Feb. 10, 1920.

Application filed June 24, 1919. Serial No. 306,502.

To all whom it may concern:

Be it known that we, CHARLES JAMES BEAVER, of Rangemoor, Crescent Road, Hale, Cheshire, England, JOHN STRATTON, of The Lindens, Winton Road, Rowdon, Cheshire, England, and ERNEST ALEXANDER CLAREMONT, of Broom Cottage, High Legh, Cheshire, England, all subjects of the King of Great Britain and Ireland, have invented certain new and useful Improvements in Lapping-Machines for Covering Electric Conductors, of which the following is a specification.

In applying strips of insulating material such as paper to a cylindrical conductor by the spiral lapping process it is very desirable that they should lie perfectly flat on the conductor.

It is usual, for mechanical reasons, to apply non-elastic, or comparatively non-elastic materials such as paper, without overlapping their edges, and to maintain a small gap between the successive convolutions of a given strip.

It is also desirable that succeeding layers of the material should bear and maintain a given predetermined relative position to each other so that the aforesaid gaps coincide, in a given cross section through the complete thickness of insulation, as infrequently as possible. In other words, the strips should be "staggered" to the greatest possible extent.

If this staggering is not accurately maintained the gaps tend to approach coincidence, and this entails electrical and mechanical weakness, the latter tending to react on the former when the cable is bent or otherwise disturbed.

It may be pointed out here that coincidence of gaps must occur in a given cross section in any appreciable thickness of dielectric composed of a number of relatively thin superimposed strips, the maximum radial distance separating such coinciding strips depending on the ratio of the amount by which the successive strips are staggered to the width of strips, and on the thickness of the strips.

It follows that it is desirable to use the greatest width of strips compatible with the mechanical exigencies occurring in the use of the completed cable, and to reduce the amount by which successive layers are staggered to the minimum which the mechanical precision of the lapping machine permits of being maintained with certainty during the lapping process.

Figure 1 is a perspective view of a portion of a lapping machine, illustrating a defect in such machines as ordinarily constructed;

Fig. 2 is a plan of a machine embodying the improvements of the present invention;

Fig. 3 is an end elevation of one of the improved lapping heads;

Fig. 4 is a side elevation of the parts shown in Fig. 3;

Fig. 5 is a detail view.

In ordinary lapping machines heretofore in use the strip of paper or other material is unwound from a coil in a spool which is rotatably mounted on a spindle or axle supported in lapping heads which are carried by a frame which revolves around the cable. In such machines difficulty is experienced in keeping the lay and consequently the staggering exactly as predetermined owing to the fact that as the coil unwinds the point or line from which the strip unwinds precedes from the circumference of the coil and moves toward the center of the coil and so disturbs the predetermined relationship between the coil and the cable.

Fig. 1 of the drawing hereto annexed illustrates this. In such figure *a* is the cable which is being covered, *b* is the strip of insulating paper being unwound from a spool *c* supported on the spindle *d* which is supported by a carriage not shown in this figure. The strip is shown in dotted lines at a later stage when the coil is partly unwound the angle of incidence of the strip to the cable being different.

The object of our invention is to prevent this relative disarrangement.

According to our invention the spindle or axle on which the coil is mounted is made to automatically move its position in relation to the frame by which it is supported toward the predetermined point or line from which the strip of paper is to be drawn off so that such point or line always bears the same relationship to the cable. This can be effected by various mechanisms preferably by mounting the spindle of the spool in a bearing or part capable of being moved in the required direction and actuated by mechanism driven directly or indirectly by the rotation of the spool for example, one end

or each end of the spindle or axle on which the spool rotates may terminate in a square block which is located in and arranged to slide along a slot in the frame in which it is supported and is made to move along such slot by means of a rotatable threaded rod extending from end to end of the slot and passing through a correspondingly threaded hole in the block to which threaded rod there is rigidly attached a ratchet wheel which is engaged by a radially arranged projection attached to the side of the spool. The parts of the mechanism must be so adjusted that on every revolution of the spool it is moved in the required direction a distance equivalent to the thickness of the paper or other material being layed on.

An example of such a mechanism is shown in Figs. 2, 3, 4 and 5 of the accompanying drawings, in which—

x are disks forming part of the lapping machine rotating around the cable a, x^1 are cross bars between the said disks, x^2 are brackets adjustably attached to the cross bars x^1, and carrying arms x^3 (whose inclination relatively to the cable is adjustable at the hinge x^4). The arms x^3 carry the lapping heads consisting of the parts now to be described. e is a rectangular frame supported by the arms x^3 and provided with a rectangular slot or opening e^1 the edges of which are at right angles to the sides of the frame, e^2 is a threaded rod rotatably mounted in the slot or opening e^1 of the frame e, e^3 is a star or ratchet wheel fixed to the threaded rod e^2. c is a spool carrying the coil of insulating paper b, mounted centrally and which rotates on the spindle d which is threaded at one end and terminates at the other end in the boss d^1. The desired resistance to the rotation of the spool in order to secure the required tension in the strip of paper in its stretch from the spool to the cable is secured by the boss d^1, the washer d^2, the spiral spring d^3, the washer d^4 and the nut d^5 by the adjustment of which nut the amount of friction on the side of the spool can be adjusted. d^6 is a slot on the threaded end of the spindle d to engage projections on the washers d^2 and d^4 to prevent them from turning on the spindle. The boss d^1 is varied in shape and size in three parts that nearest the spindle being circular in cross section and too large to go into the slot or opening e^1 in the frame e, that in the middle being rectangular in cross section of a size to make an easy fit in the said slot or opening and in length to nearly, but not entirely, extend from one side of the frame e to the other, and that farthest from the spindle being in cross section circular and smaller than the central part and threaded to receive a nut. Through the central section of the boss a hole is tapped and threaded to receive and engage the thread of the rod e^2. d^7 is a nut (engaging the threaded part of the boss) and d^8 a washer to fix and hold the spindle at right angle to the frame. f is a radially arranged flat projection or flange fixed on the spool c which engages at every revolution of the spool with a notch of the star wheel e^3.

The pitch of the thread of the rod e^2 is such that at every movement by one notch of the star wheel e^3 the boss d^1 carrying with it the spool c moves toward the other end of the frame by a distance equal to the thickness of the strip of insulating material.

For the purpose of adapting the head to suit strips of different thickness various parts can be changeable, for instance a threaded rod and a spindle with a different pitch of the thread can be substituted, or a spool provided with say two flanges could be substituted.

Our invention is not limited to the particular mechanism described but covers all arrangements whereby the spindle or axle is made to travel in the required direction to the required extent and at the required speed to maintain the relationship of the point or line from which the paper or material is being drawn off with the cable. It will be seen that by the present invention the strip of material to be wound is taken directly from the supporting spool to the object on which it is wound, without passing through or across an intermediate guide or being subjected to friction or pressure.

In the application of an insulating tape to an electric cable it has been found that the friction and rubbing between the tape and the guides which have heretofore been interposed between the supporting spool and cable is very objectionable. Such friction is likely to fray or otherwise damage the tape so that it will not be as suitable for the desired purpose as it would be if delivered from the spool direct to the cable without being subjected to friction.

What is claimed and desired to be secured by Letters Patent of the United States is:—

1. In a lapping machine a spool carrying a strip of material to be wound about an object, a spindle supporting said spool, a frame rotatable about the axis of said object and supporting said spindle and means for automatically moving the spindle intermittingly in relation to the frame a definite distance in the direction of the predetermined point or line from which the strip of material is to be unwound from the spool whereby the strip may pass directly from the spool to the object and the position of such point or line will be automatically maintained in the position determined.

2. In a lapping machine, a spool carrying a strip of material to be wound about an object, a spindle supporting said spool, a frame rotatable about the axis of said ob-

ject and supporting said spindle, and means for automatically moving the spindle in a step by step manner in relation to said frame in the direction of the predetermined point or line from which the strip of material is to be unwound from the spool, the extent of each such movement being equivalent to the thickness of the material, whereby the strip will pass directly from the spool to the object and the position of such point or line is automatically maintained in the position determined.

3. In a lapping machine a spool carrying a strip of material to be wound about an object, a spindle supporting said spool, a frame rotatable about the axis of said object and carrying said spindle, the strip passing directly from the spool to the object, and means, actuated by the rotation of the spool, for moving the spindle step by step in relation to the frame in the direction of the predetermined point or line from which the strip of material is to be unwound from the spool.

4. In a lapping machine the combination of a spool carrying a strip of material to be wound about an object, a spindle supporting said spool, a slotted frame rotatable about the axis of said object, a boss on the spindle movable in said slot in a direction toward the predetermined position of the point or line from which the strip is to be unwound from the spool, a threaded member rotatably mounted in the frame and engaging a threaded aperture in the boss, a star wheel secured to said threaded member, and a projection attached to the spool and adapted to engage said star wheel, the thread pitch of the rod and pitch of the star wheel being such that at each revolution of the spool the spindle of the latter will be turned in the direction aforesaid for a distance equal to the thickness of the strip of material.

In witness whereof we have signed this specification in the presence of two witnesses.

CHARLES JAMES BEAVER.
JOHN STRATTON.
ERNEST ALEXANDER CLAREMONT.

Witnesses:
C. A. NEALE,
F. PHILLIPS.