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APPARATUS FOR APPLYING WINDINGS TO FILAMENTS

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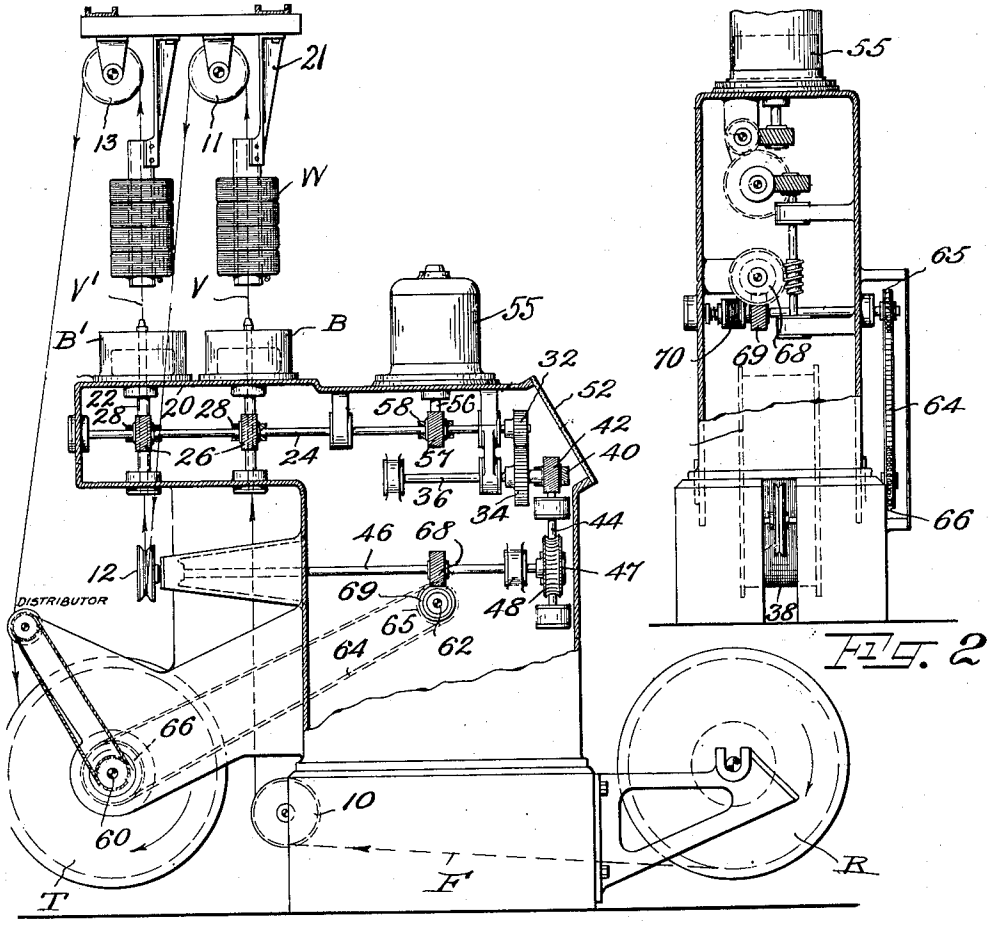


FIG. 1

FIG. 2

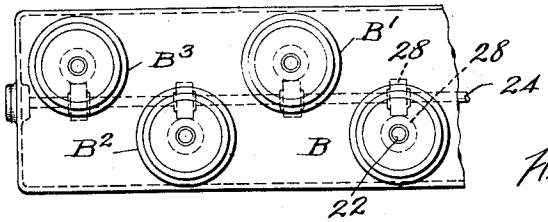


FIG. 3

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APPARATUS FOR APPLYING WINDINGS TO FILAMENTS

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10 Claims. (Cl. 117—34)

This invention relates to a method and means for applying wrappings to filaments (wires, cables, etc.), particularly of the type where the wrapping-material is applied from a rotating coil thereof traversed by the filament, and provides improvements therein.

In order to apply wrappings to filaments of considerable length, it is necessary to provide a supply of coils of the wrapping-material in line with, and so as to be traversed by, the filament, so that when the coil from which the wrapping-material is being wound around the filament is exhausted, the "flyer" or rotating bobbin which holds the coil and does the winding, may be replenished from the supply of coils traversed by the filament aforesaid, thereby avoiding cutting of the filament until the entire supply of coils of the wrapping-material is exhausted.

In a machine for applying a plurality of wrappings to a filament where the bobbins are arranged in serial alinement, and where the stack of coils of wrapping-material is of considerable height, the distance between bobbins is also considerable, so that the attendant cannot readily keep the winding operation being done by the bobbins under constant observation. The wrapping-material in a bobbin may become exhausted or it may break without the fault being readily detected.

According to the present invention, the filament is arranged in a plurality of vertical or substantially vertical flights, with each flight passing through a coil of the winding material, the winding being done at positions below the eye-level of an attendant, so that the winding may be done under the constant observation of the attendant. In the apparatus, the bobbins for doing the winding are conveniently located at about bench-height, and preferably arranged so that they are juxtaposed, to facilitate the observation, and also that they may be rotated by a common driving means. By the present arrangement of the filament in vertical flights, a plentiful supply of coils of wrapping material for each flight may be provided, all within easy reach of the attendant. The arrangement of the flights and the bobbins, as stated, makes it practicable and simple to apply a relatively large number of windings or wrappings on a single filament. The driving or feeding of the filament is conveniently effected at a turn in the filament between two flights, thereby contributing to compactness and simplicity.

The invention further provides an apparatus in which the driving parts may be compactly arranged, be relatively simple and few in number, and positively driven and interconnected so as to obtain for any one set-up, a constant relation in the speeds of the working parts. The invention further provides driving mechanism for certain parts interconnected so as to maintain a desirable ratio of speed between said parts and placed after a change-speed mechanism in the train of movement, so that said ratio of speed remains fixed for different adjustments of said change-speed mechanism.

The invention in general provides an apparatus which is relatively simple and compact; the working parts of which are conveniently arranged for stringing and setting up; in which the bobbins in which the winding is done, are so located and related that the winding operation going on therein is under constant and ready observation by an attendant; and practical for applying windings or wrappings to a filament of great length without the necessity for re-stringing and for applying a large number of such windings or wrappings.

An embodiment of the invention is illustrated in the accompanying drawing; wherein

Fig. 1 is a view partly in side elevation and partly in section of an apparatus embodying the invention;

Fig. 2 is a view, partly in rear elevation and partly in section of said apparatus;

Fig. 3 is a top plan view of a part of the apparatus showing a modified arrangement of the bobbins.

Referring to said drawing F designates a filament, as for example, a conducting wire or cable, and W designates wrapping material to be wound or wrapped around the filament, an example of such wrapping material being cotton-thread to serve as an insulation. The wrapping material may be cotton-thread, silk-thread, a strip of paper, etc.

According to the present invention, the filament F is arranged or strung in a plurality of vertical flights V, V′ etc., and the wrapping or winding wound on the filament in each flight V, V′, the winding being done at positions below the eye-level of an attendant, so that it may be done under the constant observation of the attendant. Each of the flights of the filament V, V′ passes through a coil of the wrapping material W, the coil or wrapping material W being rotated around the filament in each flight, the wrapping material paying off from the coil as the latter is rotated. The filament F is moved lengthwise through the coils during the winding, a spiral

winding being thereby applied to the filament in each flight, the filament covered in one flight having another wrapping or covering applied in each succeeding flight.

For each flight there may be provided a plurality, or supply, of coils of wrapping material W through which the filament passes. When a coil of wrapping material is exhausted, another coil may be taken from the supply and placed in winding or wrapping position, the free end of the coil of wrapping material being lapped on the end of the wrapping material from the previous coil, and thereby a continuous wrapping from successive coils applied to the filament in each flight.

Advantages of the arrangement of the filament in vertical flights are; the winding may all be done at a position below the eye-level of the attendants so that the work may go on under constant observation, depletion and breaking of the wrapping material being readily observed, and any faults in the wrapping or winding promptly corrected; a large supply of coils of wrapping material may be provided in each flight, all within convenient reach of an attendant, thereby facilitating the replenishment of coils and the facility of the work; and, by reason of the large supply of coils of wrapping material W in each flight, filaments of exceptional length may be covered without the necessity for cutting and restringing the filament. The filament F may be supplied from a reel R, and the wrapped or covered filament taken up on a reel T.

For stringing the filament F in a plurality of vertical, or substantially vertical, flights V, V', the apparatus may be provided with a succession of rolls or sheeves 10, 11, 12, 13 etc. Two vertical flights V, V' are illustrated in the drawing but it will be readily understood that the series may be continued, also that one machine may be arranged to apply windings to a plurality of filaments.

A sheeve, as the sheeve 12 may be and preferably is employed for driving or imparting lengthwise movement to the filament F, as hereinafter more fully described.

The winding is done by bobbins B, B', etc. one of each being provided for each vertical flight V, V' of the filament F in which winding is to be done. The bobbins B, B' (likewise the sheeves 10 to 13 inclusive) are preferably juxtaposed so that the apparatus may be compact, and also so that the winding being done by a group of the bobbins B, B' may be more readily observed. The bobbins are arranged below the eye-level of the attendant, and preferably are at about bench-height. In the apparatus shown the bobbins turn just above the level of a bench 20 placed about the usual height of a bench.

The bobbins are provided with hollow spindles 22, and the successive flights V, V' pass through these spindles. The bobbins for each series of vertical flights V, V' etc. are preferably all driven from a single shaft 24 through positive driving connections, such for example as gears 26 on the shaft, one for each bobbin-spindle, and gears 28, one on each bobbin spindle 22, the spindles 22 being mounted adjacent to and on a side or sides of the shaft 24 in positions for the gears 26 and 28 to mesh. As shown in Fig. 3, the spindles of a plurality of bobbins B, B', B^2, B^3, may be mounted alternately (staggered) at the sides of the shaft 24 thus providing for the use of a large number of bobbins in juxtaposition, and for constant observation of the winding operation, as hereinbefore referred to.

Above each of the bobbins, and within convenient reach, is a coil-holder 21, for holding a supply of coils of the wrapping material W. The holder 21 may be in the form of a tube, on the outside of which the coils are mounted, and through the inside of which the filament passes. Inasmuch as the spacing of the bobbins B, B' is independent of the length of filament F between bobbins, a stack of coils of any height may be provided in each flight V, V' and thereby the possibility provided of wrapping a continuous filament of great length.

To maintain a constant speed relation (for any one set-up) between the speed of rotation of the bobbins and the speed of movement of the filament F, the means for driving the filament is preferably connected with the shaft 24 which drives the bobbins through positive driving means. As here shown, the shaft 24 is provided with a gear 32 which meshes with a gear 34 on a counter-shaft 36. The counter-shaft 36 in turn has thereon a gear 42 which meshes with a gear 40 on the vertical shaft 44, and the latter drives a horizontal shaft 46 through gears 47, 48. The shaft carries the sheeve 12 around which the filament F passes, and as heretofore stated, the sheeve 12 is located at a turn of the filament F between two flights, and this serves as a part of the means for stringing the filament in said vertical flights. The shaft 46 may be located adjacent the bobbin-shaft 24, and substantially parallel therewith, thus contributing to the compactness and simplicity of the mechanical construction.

For changing the relation between the speed of the bobbins and of the filament a change-speed arrangement may be had by changing gears 32, 34 or, 40, 42 and for this purpose, the machine casing may be provided with a removable cover-plate 52 to provide ready access to these gears.

Power is transmitted to the apparatus from any suitable source, preferably from a motor 55 mounted on the apparatus, through a shaft 56 (which in a multiple apparatus would be a line shaft) and gears 57 and 58.

The take-up reel T is also preferably driven so as to take-up under tension the wrapped filament after leaving the last flight, and thereby supplementing the sheave 12 in moving the filament through the apparatus. The reel T is driven through a slip-connection so that the peripheral speed at the circumferential face of the coil of wrapped-filament on which the wrapped-filament winds as it is taken-up by the reel remains constant notwithstanding the progressive increase of the diameter of said coil. The friction of the slip-connection is so proportioned that the drag of the filament is sufficient to keep the filament under tension and to cause continuous slip at the slip-connection, while the pull of the reel on the filament is insufficient to move it faster than it is moved by the drive-sheeve 12. The reel T may be mounted on a shaft 60 driven from a shaft 62 through suitable means, as a chain 64 and sprockets 65, 66. The shaft 62 is preferably mounted adjacent the shaft 46 which drives the drive-sheeve 12 and is driven therefrom through gears 68, 69, and a slip-connection 70. One part of the slip-connection is fixed to the shaft 62 and the other to the gear 69, the latter being mounted loosely on shaft 62. The construction is such that while the speed of the shaft 46 which drives the drive-sheeve 12 may be changed (as by chang-

ing the gears 32, 34) the relative speeds of the drive-sheeve 12 and take-up reel T remain unchanged; that is the ratio between the speeds of the gears 68, 69 remains the same, which is desirable from the standpoint of adjustment for running the apparatus at different speeds, satisfactory operation of the apparatus, and simplicity of construction. If for example, the ratio between the speeds of gears 68, 69 be 1 to 1½, it will be the same whether the ratio of the gears 32, 34 be 2 to 1, 4 to 1, etc.

The invention may receive other embodiments than that herein specifically illustrated and described.

What is claimed is:

1. Apparatus for winding filaments, comprising means for stringing said filament in a plurality of vertical flights, in two or more of which flights the filament is arranged for movement in an upward direction, means for imparting movement to said filament, a plurality of rotatable bobbins for supporting coils of wrapping material to be wound around said filament, and means for rotating the bobbins, said bobbins being arranged in cooperative relation with the filament in those two or more flights in which it moves upwardly, the filament being arranged to pass upwardly through each of said coils in the bobbins, and said bobbins being located in positions below the eye-level of an attendant so that all the winding occurs at the top side of the several bobbins under the constant observation of an attendant.

2. Apparatus for winding filaments, comprising means for stringing said filament in a plurality of vertical flights, in two or more of which flights the filament is arranged for movement in an upward direction, means for imparting movement to said filament, a plurality of rotatable bobbins for supporting coils of wrapping material to be wound around said filament, and means for rotating the bobbins, said bobbins being arranged in cooperative relation with the filament in those two or more flights in which it moves upwardly, the filament being arranged to pass upwardly through each of the said coils in the bobbins, and said bobbins being located in positions below the eye-level of an attendant so that all the winding occurs at the top side of the several bobbins under the constant observation of an attendant, and a support for extra coils of wrapping material for each bobbin arranged to support the extra coils with the filament passing therethrough in the same flight as the bobbin.

3. Apparatus according to claim 1 in which said means for imparting movement to the filament comprises a sheeve or roll at a turn of the filament between flights.

4. Apparatus according to claim 1 in which said means for imparting movement to the filament and for rotating said bobbins are positive driving elements, connecting with a driving element common to the others.

5. Apparatus according to claim 1 in which said means for imparting movement to the filament comprises a sheeve or coil at a turn of the filament between flights, a take-up reel for the wound filament, and a driving connection between said take-up reel and filament driving means comprising positive inter-connected driving parts, and change-speed means ahead of said interconnected parts, the arrangement being such that said filament driving means and said driving parts connected with the take-up means always turn at a fixed ratio.

6. Apparatus according to claim 1 in which said means for imparting movement to the filament and for rotating said bobbins comprise substantially parallel adjacent shafts at different levels.

7. Apparatus according to claim 1 in which said means for imparting movement to the filament and for rotating said bobbins comprise substantially parallel, adjacent shafts at different levels, and change-speed means between said shafts.

8. Apparatus according to claim 1, in which said means for stringing said filament are so arranged that the flights are staggered, in which said bobbins are staggered, and in which the means for rotating the bobbins comprises a shaft running between the axes of the staggered bobbins.

9. Apparatus according to claim 1 in which said means for rotating said bobbins comprises a shaft, said bobbins having spindles adjacent said shaft, and gears on said spindles and shaft through which said bobbins are rotated.

10. Apparatus according to claim 1 in which said means for stringing said filament are so arranged that the flights are staggered, in which said means for rotating said bobbins comprises a shaft, and in which said bobbins are staggered and have spindles arranged on each side of said shaft, and gears on said spindles and shaft through which said bobbins are rotated.

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