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2,280,415

APPARATUS FOR THE COATING OF WIRES, CABLES, TEXTILE THREADS AND STRIPS

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Fig. 1.

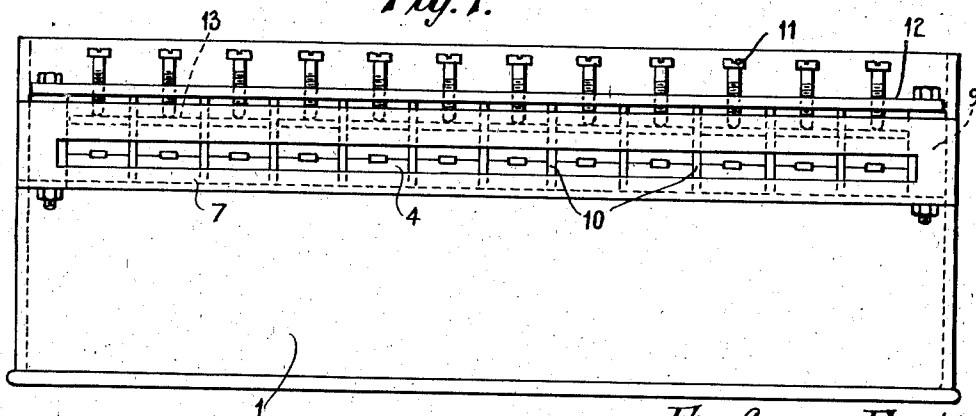


Fig. 2.

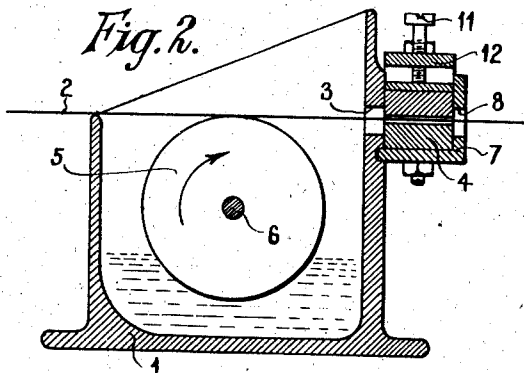


Fig. 6.

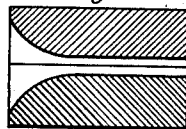


Fig. 7.

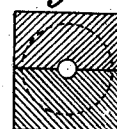


Fig. 8.

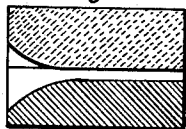


Fig. 9.

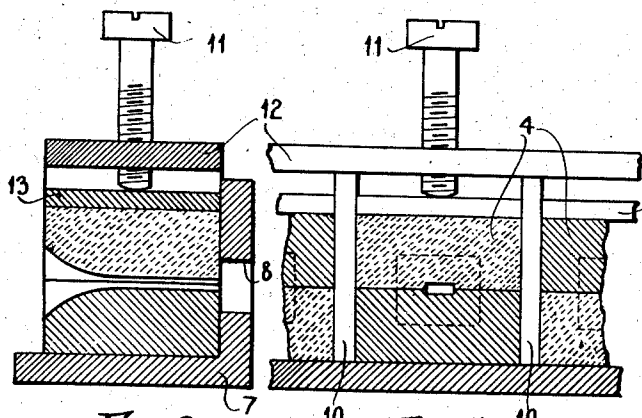
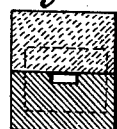


Fig. 3.

Fig. 4.

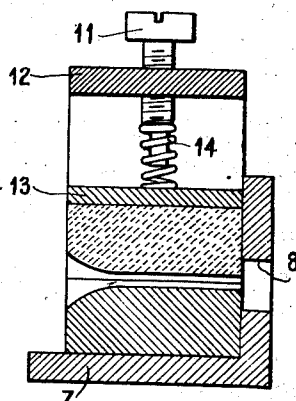


Fig. 5.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR THE COATING OF WIRES, CABLES, TEXTILE THREADS, AND STRIPS

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Application October 30, 1939, Serial No. 302,042

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13 Claims. (Cl. 91—33)

This invention relates to the coating of wires, cables, textile threads and strips, and the like with cellulose esters by passing the threads through a bath containing the cellulose ester in solution with plasticisers. Successive thin layers are applied and prior to the application of the next layer each layer is dried, preferably at a temperature of from 60° to 120° C.

The object of the present invention is to provide an improved apparatus for performing such coating operations.

According to the present invention, the coating apparatus comprises a vessel containing the cellulose ester in solution, and associated with the vessel a plurality of dies mounted in parallelism in separate compartments and individually clamped by adjustable means acting at right angles to the direction of travel of the wire or the like through the dies. Each die is advantageously disposed between two lateral spacing plates serving to locate it laterally and is clamped top and bottom between two plates, one of which is fixed and the other of which is urged into engagement with the die. In this way distension of the die as a whole is eliminated.

The die may be made in two parts which are clamped together when the die is mounted on the coating machine. For accuracy in the dimensions of the coated strip, it is preferred to employ metal dies, but where it is desired to obtain a high gloss on the finished product, some or all of the dies may be made wholly of rubber or, in the case of two-part dies, one part may be of rubber and the other part of metal. Use may also be made of glass, ebonite or wood.

In order that the invention may be more readily understood, reference will now be made to the accompanying drawing in which:

Fig. 1 shows an elevation of a coating bath and die assembly according to the invention,

Fig. 2 is a corresponding cross section,

Figs. 3 and 4 show a detail on a larger scale in cross section and fragmentary longitudinal section,

Fig. 5 shows a modification of the detail shown in Figs. 3 and 4,

Figs. 6, 7, 8 and 9 show longitudinal and cross sectional views of two embodiments of dies.

For the sake of simplicity only so much of a coating apparatus as is necessary for explaining the invention is shown in Figs. 1 and 2. The arrangement shown in these two figures is particularly suitable for applying successive thin layers, each layer being dried in an oven prior to the application of the next layer.

The strip or the like to be coated is taken from a drum or reel and passed over a guide roller to the coating bath containing the cellulose ester in solution together with plasticisers. Referring to Fig. 2, the strip 2 passes over the rear wall of the vessel 1 containing the cellulose es-

ter in solution and emerges through an opening or slot 3 in the front wall, whereafter it passes through the die 4. After leaving the die, the coated strip is dried either at room temperature or preferably in a drying oven. If, as will usually be the case, it is desired to apply a number of successive coatings the strip is returned to the cellulose ester bath over a guide roller and emerges through a die of appropriate aperture, the operation being repeated until the desired number of coatings have been applied.

Provided within the vessel 1 is an agitator wheel or roller 5 mounted on a shaft 6 which is driven in any convenient manner, e. g. by means of an external pulley not shown, so that the wheel or roller 5 rotates in the direction of the arrow. Due to this rotation, the cellulose ester solution is caused to heap up immediately above the slot 3 so that the strip 2 is completely surrounded by the solution as it enters the die 4.

An agitator wheel 5 may be provided in conjunction with each die 4 or a common agitator may be provided for a number of or all the dies.

Secured on the outer face of the front wall of the vessel 1 is an angle girder 7 which forms a trough supporting the dies 4. The outer wall of the member 7 is provided with a slot 8 corresponding to the slot 3. The member 7 can conveniently be mounted on the vessel 1 by being clamped to end blocks 9 and by the horizontal flange of the member 7 entering into a recess provided on the outer face of the slotted wall of the vessel 1. The end blocks 9 may be integral with or rigidly attached to the vessel 1. The individual dies 4 are arranged side by side in the trough 7 and are separated by interposed spacing plates 10. To secure the dies 4 in position bolts 11 in threaded engagement with a bar 12 extending above the trough, bear on the individual dies 4. The bar 12 can conveniently be secured to the end blocks 9. A plate 13 is provided above each die so as to distribute the thrust of the bolts 11 as uniformly as possible over the top surfaces of the dies.

By employing dies which are secured in this way it is possible to obtain a high degree of accuracy in the final dimensions of the coated strip 2. To obtain the greatest accuracy, the dies are made of metal and to facilitate the construction of the dies they may conveniently be made in two parts as indicated in Figs. 3-9. For a two-part die with a rectangular aperture the necessary working operations for producing the die can be minimised by providing the channel in one portion of the die only as indicated in Fig. 9. In all cases, however, it is advantageous to provide a flared end to the opening in the die at the end adjacent the cellulose ester bath. It is found however that the use of metal dies while giving great accuracy does not impart a high lustre to the coating. Consequent-

ly where a high lustre is required the dies are preferably made of rubber, either in one piece or in two sections in the same way as has already been described. The dies are in any case mounted as described above with more particular reference to Figure 2 and thus, due to the constraint applied to the outer surfaces of the die, the passage of the coated strip through the die will not cause free elastic dilation of the die. There will however be a certain elastic compression of the material of the die between the aperture and the outer surfaces and consequently the dimensions of the coated strip will not agree with the nominal dimensions of the aperture with such accuracy as with a metal die. To obtain the lustre associated with the use of a rubber die without at the same time losing the advantage of extreme accuracy obtained with a metal die it is possible in the case of two-part dies to make one part of rubber and the other part of metal. If, as is customary, a number of coatings are applied, then the relative position of the two die sections is preferably reversed in adjacent dies as indicated in Fig. 4 so that that portion of the coated strip which in one passage through the apparatus comes into contact with the rubber portion of the die comes into contact with the metal portion during the next passage through the apparatus. Consequently in the finished product the maximum departure from precise identity with the nominal cross section of the die will be the inaccuracy introduced in the final passage through the apparatus and will occur only on that side where the rubber die section is used.

It will of course be apparent that the cross section of the aperture in the die will be chosen to correspond to the desired cross section of the coated strip and the entry end of the aperture will be flared correspondingly. Figs. 6 and 7 show an example of a two-part metal die with a circular aperture, while Figs. 8 and 9 show an example of a two-part die with a rectangular aperture, the upper part of the die being made of rubber and the lower part of metal.

Fig. 5 shows a die clamping device which is particularly useful when it is necessary to coat a strip consisting of a number of lengths spliced or otherwise joined together. Normally the joint has a larger cross-section than the remainder of the strip. By causing the bolt 11 to bear on a spring 14 which in turn bears on the plate 13 the clamping pressure on the dies can be set to the required value and nevertheless the two sections of the die can move apart to permit the passage of a joint in the strip.

I claim:

1. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of separate die compartments associated with said vessel for mounting dies in parallelism, a pair of dies in each compartment providing a series of dies to consecutively operate on the same wire or the like, means adjustable at right angles to the direction of travel of the wire or the like through the dies to clamp the dies in the compartments, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, each pair of dies having an aperture for the passage of the wire or the like.

2. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing

the cellulose ester in solution, a trough-like member associated with said vessel and open at the top, removable spacing members dividing said trough-like member into a plurality of separate die compartments for mounting dies in parallelism, a pair of dies in each compartment, means adjustable at right angles to the direction of travel of the wire or the like through the dies to clamp the dies in the compartments, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies.

3. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, said vessel having a horizontal slot in one wall thereof for the emergence of the strip or the like, a trough-like member mounted on the slotted side of said vessel, said trough-like member having an open top and a slot in its outer wall opposite and in register with the slot in the vessel wall, removable spacing members dividing said trough-like member into a plurality of separate die compartments for mounting dies in parallelism, a pair of dies in each compartment, means adjustable at right angles to the direction of travel of the wire or the like through the dies to clamp the dies in the compartments, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, the apertures of said dies registering with the slots in the walls of the vessel and trough-like member.

4. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies providing a series of dies to consecutively operate on the same wire or the like, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates into clamping engagement with the dies, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said dies having apertures for the passage of the wire or the like.

5. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies providing a series of dies to consecutively operate on the same wire or the like, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates into clamping engagement with the dies, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said dies consisting of two parts which abut against each other in a plane parallel to the top and bottom clamping plates, said dies having apertures for the passage of the wire or the like.

6. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates

into clamping engagement with the dies, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said dies consisting of two parts which abut against each other in a plane parallel to the top and bottom clamping plates, one part of said dies being metal and the other part being rubber.

7. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of separate die compartments associated with said vessel for mounting dies in parallelism, a pair of dies in each compartment, means adjustable at right angles to the direction of travel of the wire or the like through the dies to clamp the dies in the compartments, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said plurality of dies having apertures therein and the apertures of adjacent dies being of progressively increasing cross-section for the successive passage of a coated strip after drying between each passage.

8. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of separate die compartments associated with said vessel for mounting dies in parallelism, a pair of dies in each compartment, means adjustable at right angles to the direction of travel of the wire or the like through the dies to clamp the dies in the compartments, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said plurality of dies having apertures therein and the apertures of adjacent dies being of progressively increasing cross-section for the successive passage of a coated strip after drying between each passage, each die being divided in a plane passing through the aperture and one part of the die being of metal and the other part of rubber, and the relative positions of the metal and rubber being reversed at successive dies.

9. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies providing a series of dies to consecutively operate on the same wire or the like, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates into clamping engagement with the dies, means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, and resilient means interposed between the urging means and the plate urged thereby, said dies having apertures for the passage of the wire or the like.

10. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of separate die compartments associated with said vessel for mounting dies in parallelism, a pair of dies in each compartment providing a series of dies to consecutively operate on the same wire or the like, means adjustable at right angles to the direction of travel of the wire or the like through the dies to clamp the dies in the compartments, and means for applying the cellulose

ester in the vessel to the wire or the like as it enters the dies, each pair of dies having an aperture for the passage of the wire or the like, the cross section of the apertures of the series of dies progressively increasing to provide for the increase in the thickness of the coating applied as the wire or the like passes through the consecutive dies.

11. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies providing a series of dies to consecutively operate on the same wire or the like, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates into clamping engagement with the dies, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said dies having apertures for the passage of the wire or the like, the cross section of the apertures of the series of dies progressively increasing to provide for the increase in the thickness of the coating applied as the wire or the like passes through the consecutive dies.

12. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies providing a series of dies to consecutively operate on the same wire or the like, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates into clamping engagement with the dies, and means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, said dies consisting of two parts which abut against each other in a plane parallel to the top and bottom clamping plates, said dies having apertures for the passage of the wire or the like, the cross section of the apertures of the series of dies progressively increasing to provide for the increase in the thickness of the coating applied as the wire or the like passes through the consecutive dies.

13. An apparatus for the coating of wires, cables, textile threads, strips and the like with cellulose esters, comprising a vessel containing the cellulose ester in solution, a plurality of dies, providing a series of dies to consecutively operate on the same wire or the like, means associated with the vessel for mounting said dies, said die-mounting means having spacing members for separating adjacent dies and top and bottom clamping plates, one of which is fixed, means for urging the other of said plates into clamping engagement with the dies, means for applying the cellulose ester in the vessel to the wire or the like as it enters the dies, and resilient means interposed between the urging means and the plate urged thereby, said dies having apertures for the passage of the wire or the like, the cross-section of the apertures of the series of dies progressively increasing to provide for the increase in the thickness of the coating applied as the wire or the like passes through the consecutive dies.

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