Oct. 29, 1946. J. A. COOK 2,410,015

APPARATUS FOR FILLING LIFE PRESERVERS AND THE LIKE

Filed Jan. 5, 1944 2 Sheets-Sheet 1

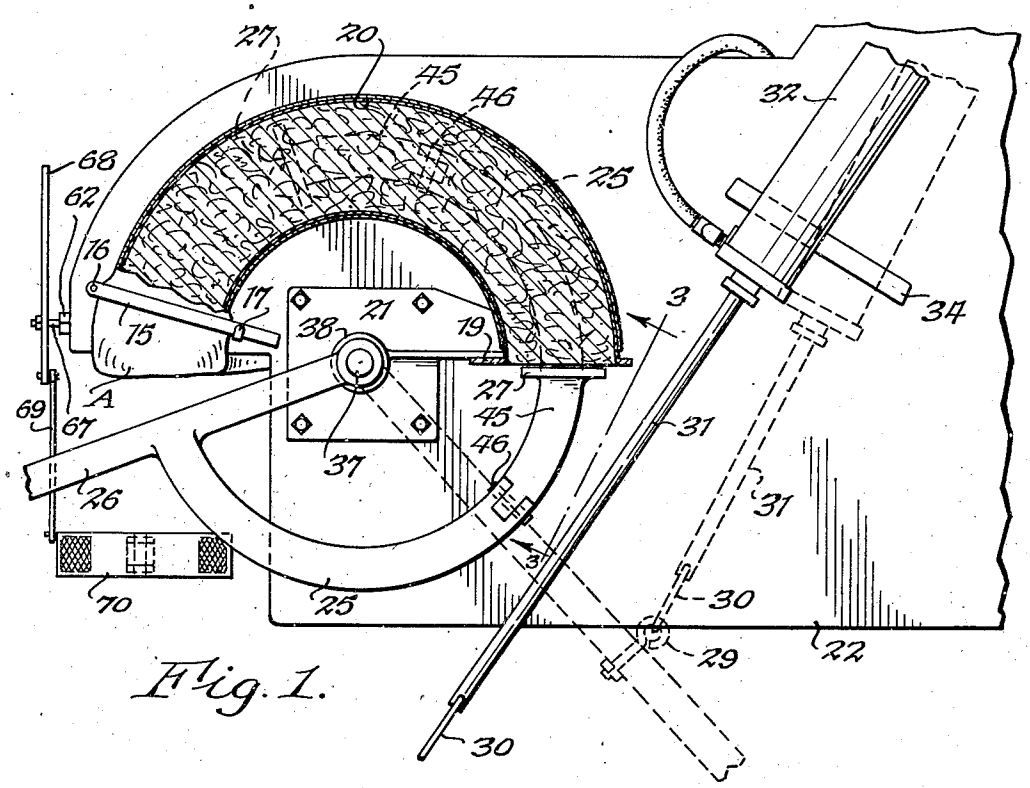


Fig. 1.

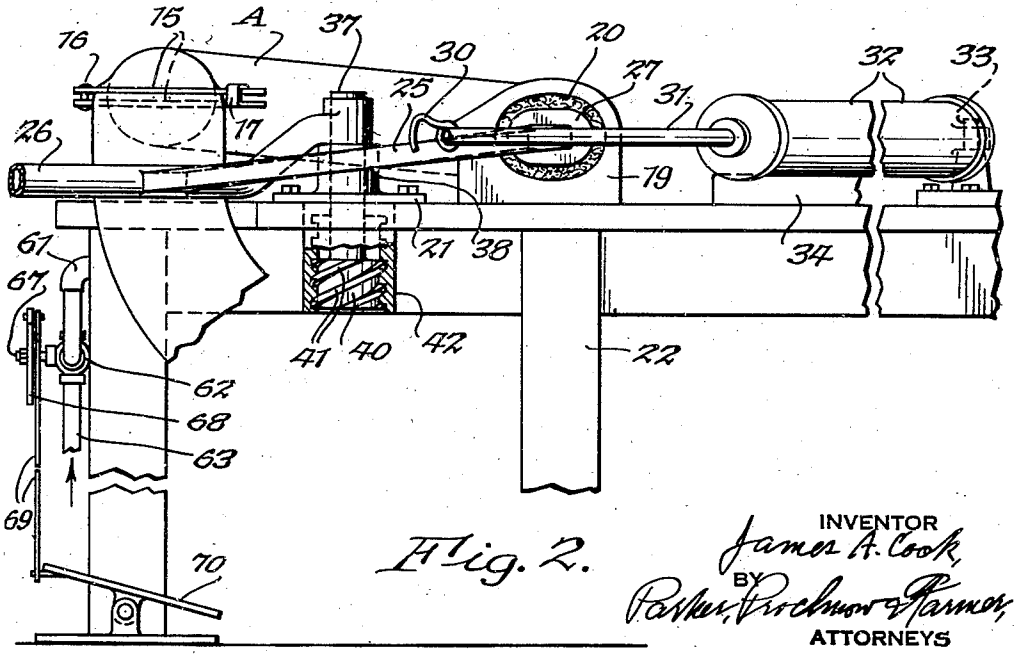


Fig. 2.

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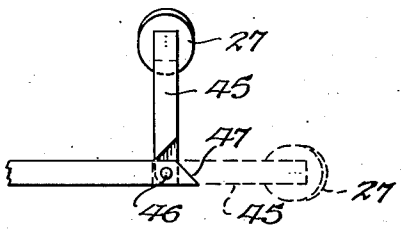


Fig. 3.

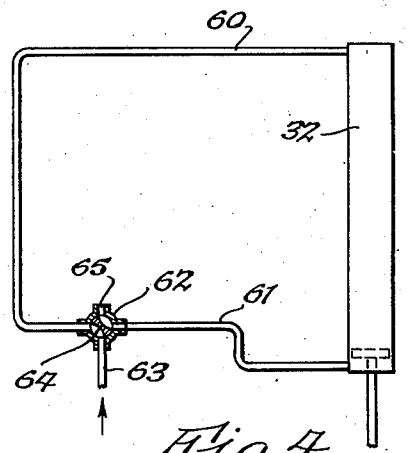


Fig. 4.

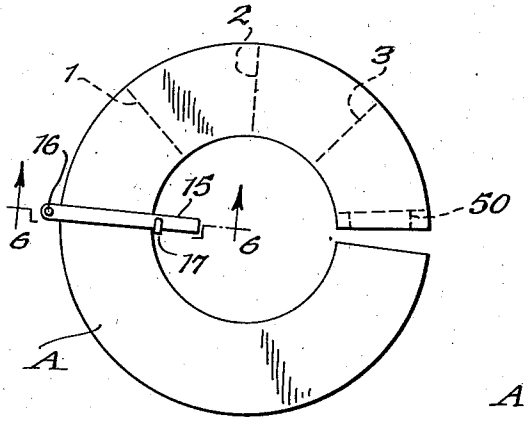


Fig. 5.

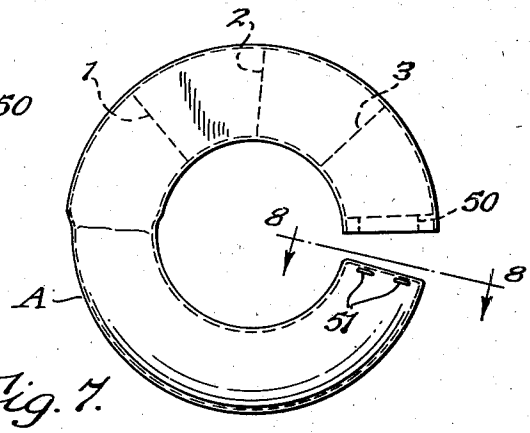


Fig. 7.

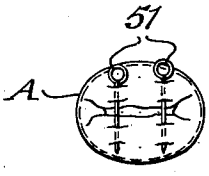


Fig. 8.

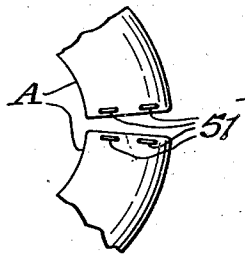


Fig. 9.

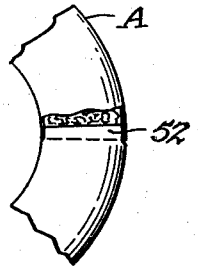


Fig. 10.

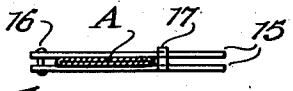


Fig. 6.



Fig. 11.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR FILLING LIFE PRESERVERS AND THE LIKE

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Application January 5, 1944, Serial No. 517,075

13 Claims. (Cl. 226—19)

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This invention relates to apparatus for packing loose buoyant material, such for example as fibrous materials, into circular casings.

In the manufacture of ring life preservers, the casings have heretofore been first sewn in circular form so as to leave open ends and then kapok or other fibrous material was stuffed by hand into the opposite open ends of the casings. This is a very time-consuming operation, since only small amounts of kapok can be tamped into the casings at one time. The tamping is generally done with a stick and it is difficult to produce life preservers by this means in which the kapok is uniformly compressed or packed in all parts of life preservers.

It is an object of this invention to provide an apparatus by means of which buoyant material can be packed into circular casings. A further object is to provide an apparatus of this kind by means of which the fibrous material may be uniformly packed into all parts of the casings. It is also an object of this invention to provide an apparatus by means of which the time required for packing buoyant material into circular casings is greatly reduced. A further object is to provide an apparatus of this type with power actuated means for compressing the buoyant material to uniform density in all parts of the casing. Another object is to provide an apparatus of this kind having a curved tube which may be inserted into a portion of the casing and a ram of curved form which enters the tube to compact the buoyant material into the casing.

Other objects and advantages of this invention will appear from the following description and claims.

In the accompanying drawings:

Fig. 1 is a top plan view, partly in section, of an apparatus embodying this invention for use in packing loose buoyant material into substantially circular casings.

Fig. 2 is a fragmentary front elevation thereof, partly in section.

Fig. 3 is a fragmentary view of the end of the ram.

Fig. 4 is a diagrammatic view showing a valve and piping for controlling the pneumatic mechanism for compressing the fibrous material.

Fig. 5 is a top plan view of the casing of a ring life preserver prior to packing loose buoyant material into the same.

Fig. 6 is a fragmentary sectional view thereof, on line 6—6, Fig. 5.

Fig. 7 is a plan view of a life preserver after half of the same has been filled with buoyant material.

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Fig. 8 is a view showing the end of a packed casing.

Fig. 9 is a fragmentary plan view of a life preserver with the two ends thereof ready for sewing.

Fig. 10 is another fragmentary plan view of a life preserver having the ends of the casing telescoped ready for sewing.

Fig. 11 is a perspective view of a block which may be used to hold the fibrous material in the casing.

My improved apparatus operates on casings of curved form, for example, on casings of substantially circular form, such as the ring life preserver casing shown in Fig. 5, having open ends into which the material with which the casings are to be stuffed is inserted, and after completing the packing or stuffing operation, the two open ends are sewn together as heretofore. Casing A of this type is shown in Fig. 5, and my apparatus includes a tube of relatively thin metal which may be inserted into one end of the casing to fit fairly snugly within the same. The tube preferably has approximately the same curvature as the final curvature of the stuffed casing. The apparatus also includes a ram which is formed to cooperate with the tube to pack the material into the interior of the tube and the casing. The curved tube and ram may be any desired length, varying from approximately half of the length of the casing A to approximately the full length thereof, but preferably the tube is not much more than half the length of the casing, and the two halves of the casing are filled successively and independently of each other by first inserting the tube into one half of the casing, then packing the material into the casing and then inserting the tube into the other half of the casing. While the first half of the casing is being filled, a clamp or other suitable stopper is provided at approximately the middle portion of the casing to confine the first half of the material to the first half of the casing. For example, a clamp may be used, as shown in Figs. 5 and 6, which may include a pair of rods or bars 15 suitably connected at one end, for example, by means of a pivot 16, and having a hook portion 17 adjacent to the other end of the clamp so that the two rods or bars may be held in clamping engagement with the casing A, as shown in Fig. 6. After one half of the casing has been packed with the material, the clamp is removed, whereupon the casing will have the appearance shown in Fig. 7, and the other half of the casing may then be operated upon.

While the apparatus shown is primarily constructed for filling the casings of ring life pre-

servers with kapok or other buoyant fibrous materials, yet it is not intended to limit this invention to such use, since the invention is applicable to devices other than life preservers and for use on materials other than fibrous materials, such as chips or granular materials.

In the accompanying drawings, 20, Figs. 1 and 2, represents the tube of the apparatus, which may be mounted in fixed position in any suitable or desired manner. For example, the end of the tube which receives the fibrous material may be suitably secured to an upright flange or extension 19 of a bracket, the base 21 of which is mounted on a table 22 or other support. The tube is, consequently, supported at one end only so that it is possible to insert the other end of the tube into an open end of the casing and then pull the casing along the tube until the open end of the casing is approximately at the receiving end of the tube, thus telescoping the casing over the tube, as clearly shown in Figs. 1 and 2.

25 represents a ram which may be made of rod or bar of metal curved substantially to the same radius as the middle portion of the tube. One end of this ram is rigidly secured to a suitable ram actuating device, which may be in the form of a lever 26, pivoted to swing about an axis concentric with the tube and the ram. The other end of the ram may be provided with a head 27. I have found that this head may vary in size and shape, depending upon the material with which the casings are stuffed. When working on kapok or other fibrous material, the head should be of such size as to leave considerable margin between the outer edges of the head and the inner surface of the tube so that loose fibrous material will not jam or bind between the head and the tube. The head should also be as large as possible without causing binding of the fibrous material so that the fibrous material may be compressed to the desired extent by a single movement of the ram into the tube. When packing the casings with granular material, such as ground cork, the head should be somewhat larger in size, to leave a smaller clearance with the interior of the tube.

The lever 26 may be of any suitable or desired length to make it possible to compress the fibrous material within the tube manually to a very considerable extent. Preferably the ram is also provided with suitable means whereby the final pressure exerted on the fibrous material may be produced by suitable power operated mechanism. Any suitable or desired power operated means may be provided for this purpose, and in the construction shown by way of example, the lever 26 is provided with an eye 29 adapted to cooperate with a hook 30 mounted on the end of a piston rod or plunger 31 connected with a piston arranged in a cylinder 32. This piston may be actuated pneumatically or hydraulically. Consequently, when the piston rod 31 is connected with the lever 26, as shown in broken lines in Fig. 1, the lever 26 may be actuated by fluid pressure in the cylinder 32 to produce the final compression of the fibrous material. In order to enable the cylinder 32 to adapt itself to the movement of the lever 26, the end of the cylinder remote from the lever is preferably pivotally mounted at 33, as shown in Fig. 2 and the other end of the cylinder rests loosely upon a suitable support or bar 34, so that the cylinder may move up or down or laterally as may be required by the movement of the lever 26.

The tube 20 may be arranged horizontally on the table so that the lever may swing from one

end of the tube to the other, the stuffed casing being sufficiently flexible to permit the tube to be bent out of the path of movement of the lever. Preferably, however, the tube 20 is of more or less spiral form so that the discharge end of the tube will be out of alinement with the lever, for example, above the lever as clearly shown in Fig. 2. This is desirable because it enables the lever and ram to swing clear of the stuffed half of the casing during the stuffing of the second half of the casing without requiring the stuffed half of the casing to be flexed or bent. It is also easier to pack the rings uniformly if they do not have a bend therein to clear the lever 26 and ram 25. If the tube 20 is of spiral form or inclined as shown in Fig. 2, the ram 25 must be correspondingly inclined or of spiral form, and should be mounted on the support in such a manner that the head 27 of the ram will follow the contour of the tube 20. Any suitable means for producing this movement of the ram may be provided, and in the construction shown for this purpose, the lever 26 is rigidly secured at one end thereof to a pivot member or pin 37 which is rotatable in a cylindrical sleeve 38 which may be formed integral with or secured to the base 21 of the bracket 19 which is secured to the table 22. In order to provide the vertical movement of the lever and ram, the pivot or bearing pin 37 is provided at the lower end thereof with an enlargement or drum 40 having spiral threads 41 formed thereon to cooperate with corresponding internal threads formed in a sleeve 42 which may also be formed integral with or rigidly secured to the base 21 of the bracket 19. The pitch of the screw threads 41 must, of course, be such that as the lever 26 is swung in a direction to move the ram into the tube, the ram will rise or move vertically to the desired extent, so that the head 27 thereof will remain at substantially the same distance from the walls of the tube 20 throughout its travel in the tube. It will be obvious that when the lever 26 is swung in a direction to move the ram into and out of the tube, the pivot 37 will be raised or lowered by the screw threads and will produce a corresponding rising and lowering of the lever and of the ram.

If desired, the ram may be made in two parts, the leading or outer part thereof being movable into a position to provide free access to the receiving end of the tube 20. Any suitable or desired construction may be employed for this purpose, and in the construction illustrated by way of example, the end of the ram on which the head 27 is formed comprises a part 45 which is pivotally mounted on the main or body portion 25 of the ram so that this part 45 may be swung upwardly about a pivot 46, the pivotal connection being preferably so formed that when in its lower position, as shown in Fig. 1, the extension 45 of the ram will engage a suitable stop 47, Fig. 3, so that this extension will form a continuation of the ram. Any other suitable means for movably mounting the end portion of the ram thereon to facilitate access to the receiving end of the tube 20 may be provided.

In the carrying out the operation of my apparatus, I divide the amount of fibrous material to be packed into the casing into a number of different substantially equal parts. For example, it may be desirable to divide the amount of material to be packed into a half casing into three or more approximately equal parts, the number of parts depending upon the size of the casing. This is preferably done by weighing the material

and dividing it into charges. When the first charge of loose material is stuffed into the tube and the ram forced into the tube to compress the fibrous material, the casing A will be filled approximately from the clamp shown in Fig. 5, to the line 1 therein. During the compressing of the fibrous material, it is desirable to press the casing against the tube to resist removal of the casing from the tube. This can be done easily by grasping the casing by hand during the compressing of the fibrous material, so that the casing will only be slid from the tube when the fibrous material is firmly compacted within the tube.

When the plunger enters the tube, the loose material in the tube is first compressed in the tube approximately to the desired density. Upon further movement of the plunger into the tube, this firmly compacted material will then be discharged from the discharge end of the tube into the casing while the casing slides from the tube. Since the tube is made of thin material and is only slightly smaller in diameter than the casing, the fibrous material will expand only to a slight extent on leaving the discharge end of the tube, and will thus exert considerable pressure on the wall of the casing so that the same will be tightly stuffed. Fibrous material, such as kapok when compressed into a casing will remain in its compressed condition in the casing without material tendency to again become loosened or flow out of the tube. Consequently, when the plunger is withdrawn after compressing the first charge of fibrous material approximately to the line 1 shown in Fig. 5, this compressed material will not change its shape materially. Consequently, the second charge of loose material is inserted into the open end of the tube 20, and when compressed, the half casing will be filled approximately to the line 2 and will also be approximately half slid off of the tube 20. The next charge will fill the casing approximately to the line 3 and the final charge is then compressed in the tube and discharged into the end portion of the casing. Preferably a block of wood or other material 50 is placed into the end of the casing for temporarily holding the fibrous material therein and this block may be held in place in any suitable manner. I have found, for example, that one or more skewers 51 may be pinned through the end of the casing beyond the outer face of the block to hold the block in place.

When half of a casing is filled with the compacted loose material and the same is confined within the casing, for example, by means of the block, the clamp 15 is removed and the empty half of the casing is then slid over the tube 20. If the material is tightly stuffed into the casing, it is very desirable to have the tube 20 of spiral form, so that no bending or deflection of the casing is necessary to clear the lever 26, which would result in the bent part of the tube being stuffed less tightly than other parts of the tube. The stuffing of the empty half of the casing with loose material is then continued as already described in connection with the first half of the tube, and another block of wood may be placed into the other end of the casing and held in place by skewers or other means. The filled casing is then ready for sewing. Before the sewing operation is started, the two blocks of wood are removed from the ends of the casing and one end of the casing is telescoped into the other end, as shown at 52 in Fig. 10, whereupon the ends of the casing may be sewn together in the usual manner.

The actuation of the plunger 31 may be effected in any suitable or desired manner by controlling the flow of fluid to and from opposite sides of the cylinder 32. In Fig. 4, I have shown diagrammatically tubes or conduits 60 and 61 leading to opposite ends of the cylinder, and a valve 62 which alternately connects the opposite ends of the cylinder with fluid under pressure from a source of supply connected with the conduit 63.

It will be noted that when the movable valve member 64 is in the position shown in Fig. 4, fluid pressure is transmitted to the pipe 60 while pressure from the pipe 61 is discharged through the exhaust opening 65 of the valve. When the valve 64 is swung in a clockwise direction through an angle of about 90 degrees, fluid pressure will be conducted through the conduit 61 and the conduit 60 will be connected to exhaust port 65 of the valve. Valve 62 may be mounted on or near the table 22, as shown in Figs. 1 and 2, and the valve may have its stem 67 connected to a hand lever 68, and one end of this lever may be connected by means of a link 69 to a foot treadle 70 to facilitate the control of the power operated mechanism for moving the lever 26. Any other suitable means for controlling the power for operating this lever may be provided.

When life preservers are stuffed with loose material by means of the method and apparatus herein described, they are of uniform hardness throughout the surface, there being no particularly hard or soft spots, so that there will be the minimum of strains on the casing, thus increasing the life of the life preservers.

By means of the apparatus described, the buoyant or fibrous material can be quickly and easily packed into the casings and in place of the slow and laborious tamping of the material by hand into the casings, only one movement of the ram is required for each charge of material, thus greatly reducing the time required to produce life preservers or other stuffed articles. The first part of the movement of the ram into the tube 20 can, of course, be easily effected by hand, since very little force is required for the initial compression of the material. After this initial movement, the power is applied to the ram, and since this power may be kept uniform by control of the fluid pressure supplied to the cylinder 32, a uniform compacting of all charges of the material will result. As the casing becomes filled, it is slid off the tube by the plunger and in the construction shown, the filled portion of the casing rests upon the ram 25. In place of gripping the casing by hand to yieldingly hold it on the tube, other gripping means may, of course, be employed.

I claim as my invention:

1. Apparatus for packing loose material into substantially circular open ended casings, including a tube open at both ends and having a curvature corresponding to that of the casing and which may be inserted into a casing to be filled, a ram having a curvature corresponding to that of the tube, means for producing relative movement of said ram and tube in a curved path to cause relative movement of said ram into and out of said tube to compact loose material inserted into the tube and to discharge the compacted material from the tube into the casing.

2. Apparatus for packing loose material into substantially circular open ended casings, including a tube open at both ends and having a curvature corresponding to that of the casing and

about which a casing to be filled may be telescoped, means for mounting one end of said tube on a fixed support with the remainder of said tube in spaced relation to said support, and a ram having a curvature substantially the same as the curvature of the middle portion of said tube and mounted to move into and out of said tube for compressing material placed into said end of said tube and discharging the same from the other end of said tube into said casing.

3. Apparatus for packing loose material into substantially circular open ended casings, including a tube open at both ends and having a curvature corresponding to that of the casing and about which a casing to be filled may be telescoped, a ram having a curvature corresponding to that of the tube and movable along a curved path into and out of said tube to compact loose material inserted into the tube and to discharge the compacted material from the tube into the casing, and power actuated means for producing movement of said ram.

4. Apparatus for packing loose material into open ended casings of substantially circular form, said apparatus including a tube open at both ends and having a curvature similar to that of the casing and of a diameter only slightly smaller than the inside diameter of the casing to be filled and supported in fixed relation to said apparatus at one end thereof, and a ram for cooperation with said tube, said ram being pivoted about an axis substantially concentric with the axis of curvature of said tube to enable said ram to move into and out of said supported end of said tube throughout substantially the length of said tube.

5. An apparatus for packing loose material into substantially circular casings, including a thin tube shaped to fit snugly inside the casings and open at both ends and having a curvature substantially similar to that of the casings to be filled, means for securing one end of said tube to a fixed support, a ram having a curvature corresponding to the curvature of the middle portion of said tube and of sufficient length to extend substantially from one end to the other of said tube, and a lever to which one end of said ram is connected and which is pivoted substantially on the axis of curvature of said tube.

6. An apparatus for packing loose material into substantially circular casings, including a thin tube shaped to fit snugly inside the casings and open at both ends and having a curvature substantially similar to that of the casings to be filled, means for securing one end of said tube to a fixed support, a ram having a curvature corresponding to the curvature of the middle portion of said tube and of sufficient length to extend substantially from one end to the other of said tube, a lever to which one end of said ram is connected and which is pivoted substantially on the axis of curvature of said tube, and power actuated means adapted to be connected to said lever for imparting movement of the ram into said tube.

7. An apparatus for packing loose material into substantially circular casings, including a thin tube shaped to fit snugly inside the casings and open at both ends and having a curvature substantially similar to that of the casings to be filled, means for securing one end of said tube to a fixed support, a ram having a curvature corresponding to the curvature of the middle portion of said tube and of sufficient length to extend substantially from one end to the other of said tube, a lever to which one end of said ram is connected and which is pivoted substantially on the axis of curvature of said tube, and a plunger actuated by fluid under pressure and constructed to be connected with said lever for swinging the same to move said ram into said tube.

8. An apparatus for packing loose fibrous material into substantially circular open ended casings, including a tube having a curvature corresponding to that of the casing and of not materially more than half the length of the casing, said tube being open at both ends and formed to have one end thereof inserted into a casing and to have fibrous material supplied to the other end thereof, means for securing said other end of said tube in fixed relation to the apparatus, and an arc-shaped ram having one end thereof adapted to enter into said other end of said tube and having the opposite end of said ram pivoted on an axis substantially coinciding with the axis of curvature of said tube, said ram having a head of materially larger transverse area than the body portion of said ram.

9. An apparatus for packing loose fibrous material into substantially circular open ended casings, including a tube having a curvature corresponding to that of the casing and of not materially more than half the length of the casing, said tube being open at both ends and formed to have one end thereof inserted into a casing and to have fibrous material supplied to the other end thereof, means for securing said other end of said tube in fixed relation to the apparatus, and an arc-shaped ram having one end thereof adapted to enter into said other end of said tube and having the opposite end of said ram pivoted on an axis substantially coinciding with the axis of curvature of said tube, said ram having a head of materially larger transverse area than the body portion of said ram, the portion of said ram adjacent to said head being movable relatively to the body portion of said ram to move out of operative relation to said other end of said tube to afford access thereto.

10. An apparatus according to claim 9 characterized in that the end portion of the ram is pivoted on the body portion thereof to swing relatively to the same to provide access to said other end of said tube, and means for holding said pivoted part of said ram in operative relation to the body portion thereof when said ram is inserted in said tube.

11. An apparatus for packing loose material into substantially circular open ended casings, including a tube having a curvature corresponding to that of the casing and of not materially more than half the length of the casing, said tube being open at both ends and formed to have one end thereof inserted into a casing and to have material supplied to the other end thereof, means for securing said other end of said tube in fixed relation to the apparatus, so that said tube occupies a substantially spiral position, a ram having a curvature corresponding to the middle portion of said tube and also of substantially spiral shape, and means for mounting said ram to enable the same to swing into and out of said tube.

12. An apparatus for packing loose material into substantially circular open ended casings, including a tube having a curvature corresponding to that of the casing and of not materially more than half the length of the casing, said tube being open at both ends and formed to have one end thereof inserted into a casing and to have

material supplied to the other end thereof, means for securing said other end of said tube in fixed relation to the apparatus, so that said tube occupies the substantially spiral position, a ram having a curvature corresponding to the middle portion of said tube and also of substantially spiral shape, and a pivot pin substantially coaxial with the curvature of said tube and to which said ram is secured, and means for imparting vertical movement to said pivot pin during the swinging of said ram to cause said ram to swing in a substantially spiral path substantially coinciding with the middle portion of said tube.

13. An apparatus for packing loose material into substantially circular open ended casings, including a tube open at both ends and of substantially spiral shape and of a length not materially in excess of half of the length of the casing, means for mounting the lower end of said tube in fixed relation to the apparatus, a ram pivotally mounted substantially concentrically with said spiral tube and also of spiral form, and means for raising and lowering said ram during the swinging of the same into and out of said tube.

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