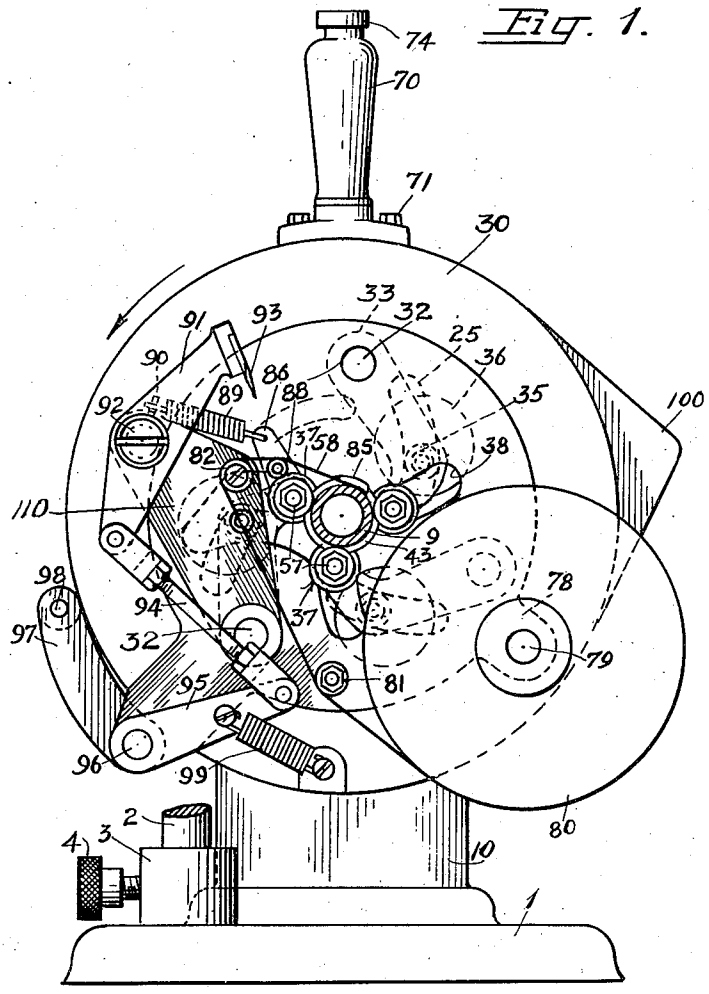
Dec. 7, 1948. W. E. GERBING 2,455,860

TUBE CAPPING MACHINE

Filed Nov. 22, 1943 4 Sheets-Sheet 1

Fig. 1.



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TUBE CAPPING MACHINE

Filed Nov. 22, 1943 4 Sheets-Sheet 2

Fig. 2.

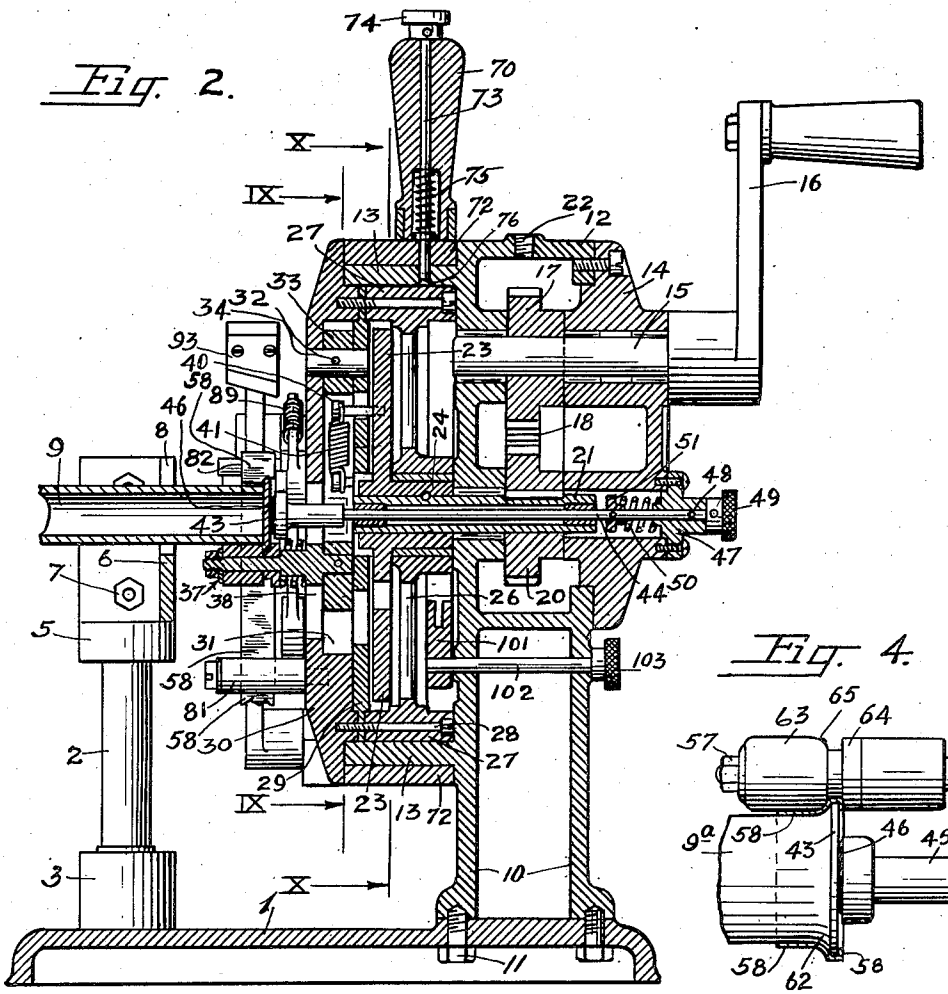


Fig. 4.

Fig. 3.

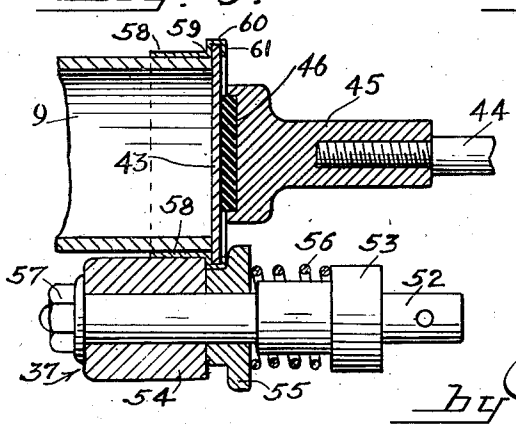
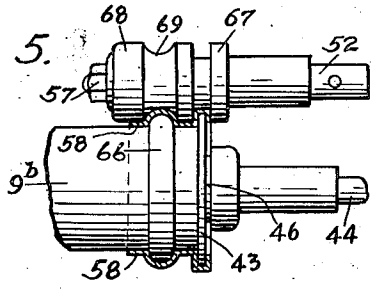


Fig. 5.



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TUBE CAPPING MACHINE

Filed Nov. 22, 1943 4 Sheets-Sheet 3

Fig. 6.

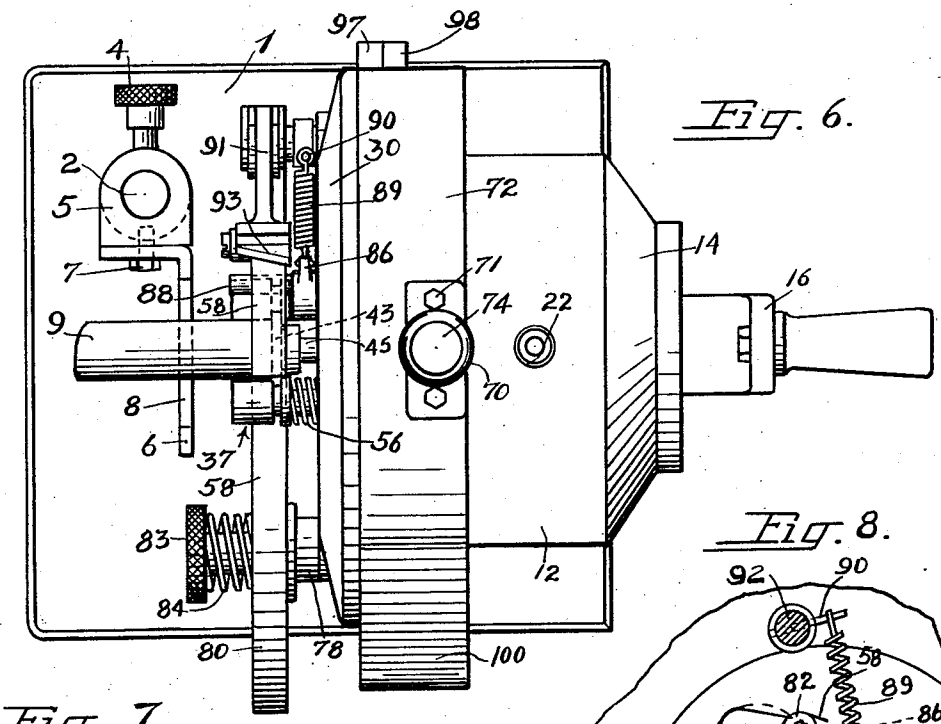


Fig. 8.

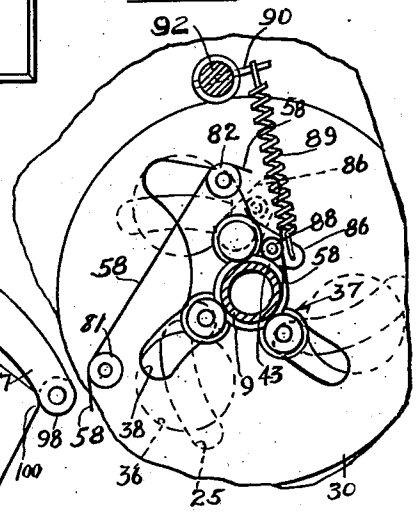
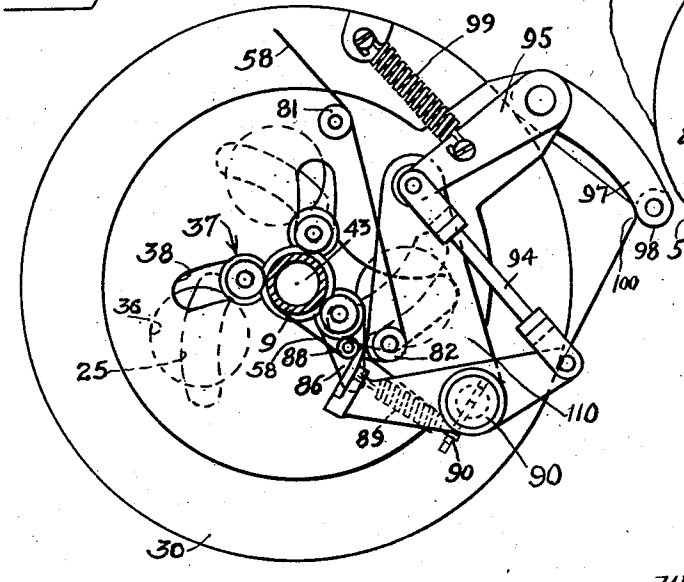


Fig. 7.



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TUBE CAPPING MACHINE

Filed Nov. 22, 1943 4 Sheets-Sheet 4

Fig. 9.

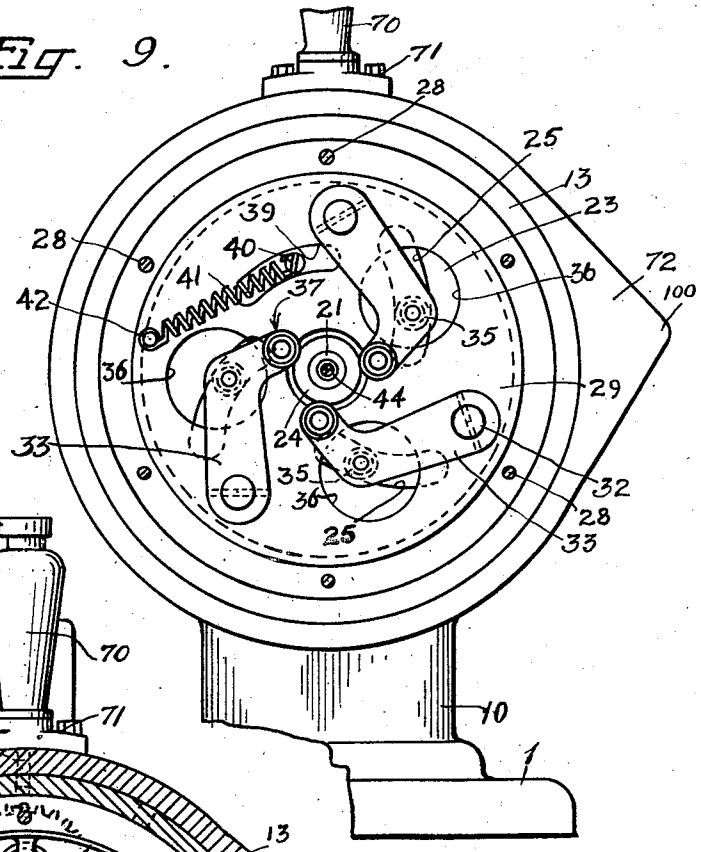
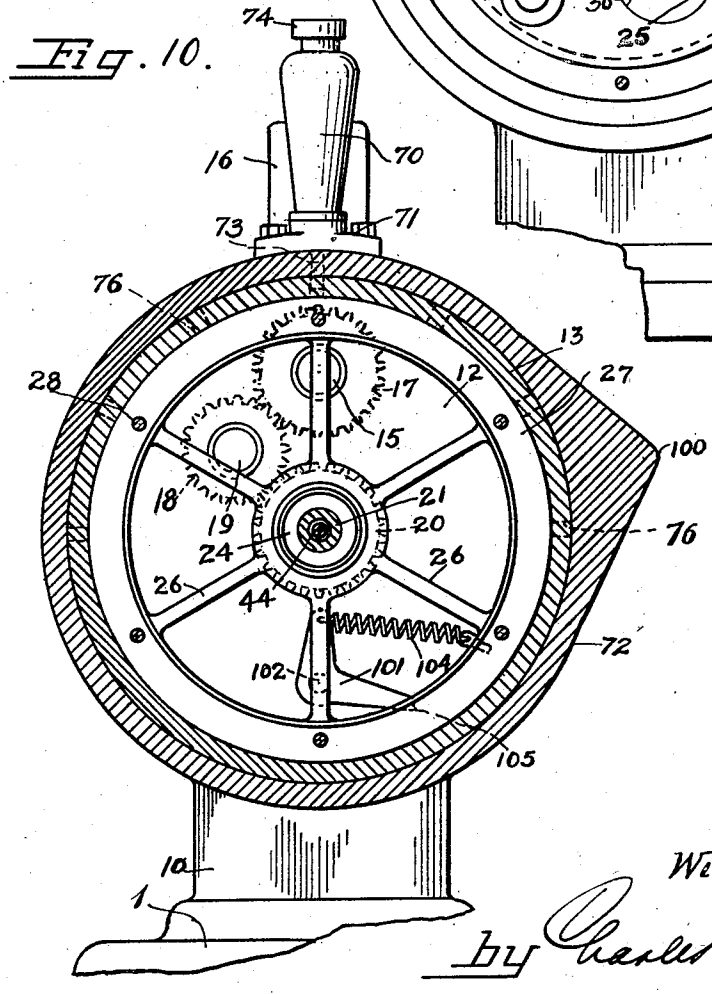


Fig. 10.



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UNITED STATES PATENT OFFICE

2,455,860

TUBE CAPPING MACHINE

Willard E. Gerbing, Chicago, Ill., assignor to The Scholl Mfg. Co., Inc., Chicago, Ill., a corporation of New York

Application November 22, 1943, Serial No. 511,271

8 Claims. (Cl. 93—56)

1

This invention relates to improvements in a tube capping machine, highly desirable for use in connection with the temporary yet effective capping of tubes, pipes, conduits, etc. of various sizes, with especial reference both to flexible and rigid tubing of the character used in connection with gas lines, oil lines, air lines, conduits for electrical wiring, etc., both for the purpose of maintaining the interior of such tubing in a clean condition until time for use and also to a reasonable extent to prevent sabotage of the tubing, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

Air, land and water vehicles, both self-powered and otherwise, include in their construction a considerable amount of tubing, conduits, piping, and the like, both in immediate association with the engines and also in other parts of the vehicle. It is essential that many of these vehicles, especially ships, carry a supply of such tubing, both flexible and rigid, in various sizes in order to make necessary repairs when needed. It is desirable that such tubing and the like, when constructed, be kept entirely clean inside until it is used, and accordingly the tubing is preferably capped at each end, and such capping is removed at the time of use. It has been found desirable to cap the tubing prior to use even though the tubing may only be moved from one point in a plant to another point in the same plant for installation, as well as capping the tubing for transfer from one geographical location to another. In so capping the tubing, it is essential to provide means that positively seal the interior of the tubing, as well as means that may be removed expeditiously when it is desired to put the tubing into use. At the same time, the capping should be such that it cannot be substantially disturbed without leaving a tell-tale indication that it had been disturbed, in order to eliminate sabotage as much as possible. It is also desirable, for the same reasons, to provide a capping arrangement such that no portion of the capping arrangement be left within the tube at the time it is removed, either intentionally or accidentally, and further, the capping arrangement should be such as to afford some protection for the tubing during handling.

With the foregoing in mind, it is an important object of the instant invention to provide a machine for quickly and efficiently capping a tube, pipe, conduit, or the like, the machine being arranged to operate upon various sizes of tubing.

Another object of the invention is the provision of a tube capping machine arranged to quickly and positively cap a tube or the like in such a manner that the capping structure cannot be removed and replaced, or partially opened and again sealed, without most frequently leaving tell-tale evidence of any such unwarranted tampering with the finished capping.

2

It is also an object of this invention to provide a tube capping mechanism arranged not only to operate on tubing and the like of different diameters, but also arranged to operate with equal facility on tubing having differently shaped end portions.

Still another object of this invention resides in the provision of tube capping means wherein an oversized cap is applied to the end of the tube and held thereon by adhesive tape or the equivalent, the machine placing the tape intimately around both the end of the tube and the oversized circumferential portion of the capping member.

A further object of the invention resides in the provision of a capping mechanism designed to hold a capping member in position against the end of a tube or the like, and from a supply carried by the mechanism itself secure the cap to the end of the tube with the aid of adhesive tape or the equivalent.

It is also a feature of this invention to provide a tube capping machine in which resiliently urged elements are included to act upon the end of the tube and the capping member, these elements being complementally shaped to both the end of the tube and the capping member, and unite the capping member to the tube with the aid of adhesive tape, such elements being adjustable to accommodate tubings and capping members of different sizes.

Still another object of the invention is the provision of a tube capping machine provided with means to smoothly and intimately apply adhesive tape over the tube end and the capping member, with the tube end and capping member of different relative sizes.

It is also an object of this invention to provide a tube capping mechanism including rotary elements for applying an adhesive tape strip over the end of the tube and capping member, such rotary elements being urged by camming means into tight association with the end of the tube and the capping member and being propelled around the tube by the aid of that same camming means.

Still another object of the invention resides in the provision of a tube capping mechanism by which a capping member is held to the end of the tube with the aid of adhesive tape, the mechanism carrying its own supply of adhesive tape, and being so arranged as to automatically cut off adhesive tape of the required length, and to use only the proportional amount of tape for tubes of different diameters without the need of adjusting the mechanism.

It is a still further object of this invention to provide new and novel as well as economical and efficient capping means for the end of a tube or the like.

Also an object of the invention resides in the

provision of capping means for a tube or the like so designed as to eliminate to a reasonable extent sabotaging efforts, and also designed so as to lend protection to the end of the tube while the capping means are in place.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a fragmentary front elevational view of a machine or apparatus embodying principles of the instant invention, showing the tube being worked upon in section;

Figure 2 is a central vertical sectional view, with parts omitted and parts shown in elevation, of the structure shown in Figure 1;

Figure 3 is a fragmentary vertical sectional view, this figure being an enlargement of the adhesive tape applying structure seen in the central left-hand portion of Figure 2;

Figure 4 is a fragmentary elevational view illustrating the use of an adhesive tape applying construction of slightly different form, consistent with the tube having a different end shape;

Figure 5 is a fragmentary elevational view, with parts in section, illustrating a still different form of adhesive tape applying structure consistent with a tube having a different end formation;

Figure 6 is a top plan view of the structure of Figures 1 and 2;

Figure 7 is a front elevational view of a portion of the structure seen in Figure 1, showing the same in a different position of operation, with the tube being acted upon shown in section;

Figure 8 is a fragmentary front vertical sectional view similar in location to Figure 7, but with the tape cutting mechanism eliminated;

Figure 9 is a fragmentary vertical sectional view taken substantially as indicated by the line IX—IX of Figure 2 with the front plate removed; and

Figure 10 is also a fragmentary vertical sectional view taken substantially as indicated by the line X—X of Figure 2.

As shown on the drawings:

In the illustrated embodiment of this invention there is shown a tube capping machine including a base 1 from a forward corner portion of which an adjustable upstanding support 2 is provided. This support seats at its lower end in a suitable socket 3 equipped with a thumb set screw or the equivalent 4 by means of which the support 2 may be anchored in a suitable position of vertical adjustment. At the upper end thereof the support 2 carries a fixed sleeve 5 (Figures 2 and 6) to which a laterally extending supporting bracket 6 is anchored by one or more thumb bolts 7. The support 6 is provided with a V-shaped or equivalent notch 8 in which a tube, pipe, conduit, or the like 9 is seated when the inner end thereof is being capped. Vertical adjustment of the tube support 6 may be had with the set screw 4, so that the support is capable of holding tubes of various diameters in proper position for capping.

At the rear portion of the base 1 an upstanding fixed frame 10 is provided which is secured to the base by any suitable means, such as a series of stud bolts 11. The upper portion of this frame is shaped into a cylindrical housing formation 12, and integral bosses are provided within this housing portion 12 to function as bearing holders for shafts to be later described. Extending forwardly from the housing portion 12 is a fixed cylindrical portion 13 which contains the rotary actuating and control mechanism for the capping elements, also later to be described.

Bolted or otherwise equivalently secured to the open rear part of the housing portion 12 of the frame is a relatively fixed closure member 14, Figures 2 and 6. This closure 14, together with the internal construction of the housing part 12, journals a main drive shaft 15 (Figure 2) on the outer end of which is a manually operable crank 16. It will be appreciated that a suitable mechanical drive may be employed in lieu of the crank, if so desired, but for much of the operation of the tube capping machine a manually actuated crank is satisfactory. Within the housing part 12 a gear 17 is fixed to the shaft 15, and this gear meshes in turn with an offset gear 18 carried on a shaft 19 (Figure 10), which offset gear in turn meshes with a centrally disposed gear 20 keyed as seen in Figure 2 to a hollow shaft 21 concentric with the axis of the rotary parts of the machine. The arrangement of the drive gear just above described results in the hollow main shaft 21 being driven in the same direction as the hand crank 16 is turned. The housing portion 12 of the frame is preferably provided with a plug opening 22 or the equivalent at the top thereof in order to facilitate the application of lubricant to the gear train 17, 18 and 20.

Keyed to the forward end of the hollow drive shaft 21 is a disc-like cam plate 23 which has an elongated hub 24 secured to the hollow shaft 21. This cam plate is provided with a series of inwardly extending curvate slots 25 spaced equidistantly apart. In the illustrated instance, there are three of these slots shown, because there are three tape applying rollers included in the illustrated apparatus, and each one of the slots govern the action of one tape applying roller in a manner later set forth. It is obvious that if a greater number of tape applying rollers is used, there will be a greater number of such cam slots 25.

Just to the rear of the cam disc 23 is a spoked wheel 26, the flange 27 of which overlies the circumferential edge of the cam disc 23. This spoked wheel may be rotated on bearings floating around the hub of the cam disc 23. Extending through the flange 27 of the wheel 26 is an annular series of elongated bolts 28, and these bolts secure the narrowed circumferential margin of another disc-like member 29 to the wheel 26. Also held by the same series of bolts 28 is a front plate 30 which is hollowed inside to provide a space 31 between itself and the plate 29. It will be thus seen that the wheel 26, the plate 29, and the front plate 30 are all rotatable together as a unit. With reference to Figure 2, it will be seen that the front plate 30 has a beveled outer margin and is outwardly flanged so as to extend over the fixed cylindrical portion 13 of the frame and provide an adequate closure for the front of the machine as well as enhance the appearance of the machine.

Journaled in both the plate 29 and the front plate 30 is a plurality of equidistantly spaced shafts 32, in the illustrated instance there being three such shafts. In the space 31 between the plates 29 and 30 a series of bell cranks 33 is provided, each bell crank having one end keyed to one of the shafts 32 as indicated at 34 in Figure 2. Each bell crank as best seen in Figure 9 carries a roller 35 on the rear side of its elbow, which roller seats within one of the aforesaid arcuate

slots 25 in the cam plate 23, there being a relatively large aperture or opening 36 in the plate 29 through which each of the cam rollers 35 extends. The free end of each of the bell cranks 33 carries an outwardly extending roller arrangement generally indicated by numeral 37 for applying adhesive tape directly to the tubing and the capping member. The tape applying roller arrangement 37 extends through a suitable slot 38 in the front plate 30, as best seen in Figures 7 and 8. The slots 38 are arcuate so that the roller arrangement may move inwardly and outwardly in keeping with tubing of various diameters.

With reference more particularly to Figures 2 and 9 it will be seen that the plate 29 is provided with another arcuate slot 39 through which a stud 40 fastened to the cam disc 23 extends. A spring 41 has one end fastened to the stud 40, and the other end attached to a stud 42 secured to the outer surface of the plate 29. This spring is under tension at all times and tends to create a relative movement between the cam disc 23 and the plate 29 as well as the front plate 30 and the spoked wheel 26 connected to the plate 29 in a direction such as to urge the free ends of the bell cranks 33 inwardly. This is by virtue of the rider rolls 35 being urged inwardly by the arcuate cam slots 25. Thus, the roller arrangements 37 are constantly urged toward each other so as to act upon a tube of the smallest diameter, and therefore no matter what size tube these rollers act upon, they are under a positive pressure against that tube.

As illustrated in connection wtih the instant invention, the capping member itself, as applied to the tubing 9, is indicated by numeral 43 as best seen in Figure 3. This capping member is illustrated in the form of a disc made of pressed fibre or the equivalent and which is preferably oversized in comparison with the tubing 9. That is, the disc projects circumferentially beyond the tubing so that the disc cannot be advertently or intentionally pushed into the tubing and left there. Further, the cap being oversize tends to protect the edge of the tubing against injury by virtue of the fact that if the end of the tubing is bumped against the floor or some other object, it is the capping member that takes the impact.

Resiliently urged means are provided to hold the capping member 43 in position against the end of the tubing 9 during the attaching operation. These means include a plunger rod 44 having a plunger head 45 thereon as best seen in Figure 3, which plunger head is provided with a resilient insert 46, made of rubber or equivalent material. This insert bears directly against the central portion of the disc or capping member 43 and urges it positively against the end of the tubing 9. At the rear end thereof the plunger rod 44 passes through a bushing member 47 secured to the fixed portion of the frame. The rod may be keyed to the bushing member as indicated at 48 to prevent rotational movement of the rod, but the key is so arranged that the rod is longitudinally slidable through the bushing. On the outer end of the rod is secured a hand button 49 by means of which the rod may be retracted against the action of a spring 50 disposed between the bushing 47 and a collar 51 keyed to an intermediate point along the rod. The action of the spring 50 is such as to constantly urge the rod forwardly so that the head 45 through its insert 46 presses firmly the capping member or disc 43.

With reference now to Figure 3, it will be seen that each of the tape applying roller arrangements 37 includes a shaft 52 having an enlarged portion 53 which rides in the groove 38 in the front plate 30. On the forward portion of the shaft 52 is a roller 54, and immediately behind this roller is a flanged collar member 55 having a forward portion of smaller diameter than the roller and a rear flange portion of larger diameter. Obviously, the parts 54 and 55 may be integral if so desired. A compression spring 56 disposed between the enlarged portion 53 and the flange of the member 55 urges the flange member and roller outwardly against a nut and washer arrangement 57 on the extreme outer end of the shaft 52. Both the roller and the member 55 rotate freely on the shaft and relatively to the shaft, pressing against a tape strip 58. This tape strip is of sufficient width to engage a portion of the ends of the tubing 9 and intimately fit over the outer circumferential margin of the capping member 43. The part of the flanged member 55 of smallest diameter receives the circumferential edge of the capping member, and the flange portion presses the tape over the adjacent face of the capping member. With this arrangement, it will be noted especially that the strip of tape 58 intimately fits around the end of the tubing 9, makes a substantially right angle bend as indicated at 59 and extends outwardly over the adjacent protruding margin of the capping member, crosses over the circumferential edge of the capping member as indicated at 60, and then a margin of the tape extends over the opposite face of the capping member as indicated at 61. With the roller arrangements 37 positively urged against the tape during its application of the tubing and capping member, the application of the tape will be smooth and even. The capping member is firmly held in position over the end of the tubing, and if any attempt is made to remove the capping member, it will be substantially impossible to replace the tape in its original position without disarranging it, adversely affecting its neat appearance, or in some other manner leaving a tell-tale disclosure that the capping has been tampered with. Thus, to a great extent, the capping arrangement embodied in this invention prevents sabotage.

Not all tubes will have the same end formation. With this thought in mind, I have illustrated a tube 9a in Figure 4 having a flared end as indicated at 62. With such a tube, the same cap-holding mechanism as above described is used, as well as the same cap 43, although due to the flare on the end of the tube, the cap 43 will not project as far beyond the tube circumferentially as it did in the arrangement shown in Figure 3. In applying the tape strip 28 over the tube end and capping member, it is only necessary to substitute a different form of the roller arrangements 37.

Such change may be expeditiously accomplished by simply removing the nut and washer arrangement 57, sliding the previously discussed roller off the shaft, and sliding a roller 63 on the shaft with a flanged member 64 ahead of it. The flanged member 64 corresponds to the previously discussed flange member 55 and the roller 63 is the same in operation as the roller 64, with the exception that the roller 63 has a rounded contour as indicated at 65 to intimately seat the tape 58 over the flared or belled portion of the tubing 9a. As above explained, the flanged member 64 causes the tape to seat intimately over the circumferential edge of the capping disc 43 and

also provides a marginal portion of the tape on the face of the capping member.

In Figure 5 I have illustrated a tube 9b having a different end formation. In this instance, the tube is provided with a bead 66 spaced a short distance back from the end of the tube. As in the previously discussed embodiment, the same capping member and holding arrangement are utilized. The roller arrangement for pressing the tape strip 58 around the tube and capping member embodies a flanged element 67 of substantially the same construction as the aforesaid flange element 64 and a roller 68 grooved as indicated at 69 to intimately apply the tape of the tube bead 66. The application of the tape to the tube and capping member is again clean, even and entirely smooth in appearance.

It will be appreciated that the same length of tape will not be required for all tubes and capping members, since the instant invention is arranged to accommodate tubes and capping members of many various sizes. It is therefore desirable to provide means for positively setting the apparatus to insure the severance of the tape strip 58 at the proper time depending upon the particular length of tape desired for the particular tube and capping member.

To this end, a handle 70 is provided which is bolted or otherwise secured, as indicated at 71, to a ring 72 surrounding the forwardly extending fixed cylindrical portion 13 of the frame behind the flange of the front plate 30, as seen clearly in Figure 2. Freely extending through a bore in the handle 70 is a reciprocatory plunger rod 73 terminating at its upper end in a thumb button 74 on top of the handle 70. Near its inner end the handle is hollowed inside to accommodate a spring 75 bearing against the bottom of the hollow and also against a suitable collar on the rod 73 so as to urge this rod inwardly to cause the inner end of the rod to seat within a hole or aperture 76 in the cylindrical frame portion 13. With reference to Figure 10 it will be seen that this cylindrical frame portion has a number of such apertures 76 spaced equidistantly apart over substantially half the ring. In the illustrated instance there are seven such apertures, and it is a simple expedient to elevate the thumb button 74 until the rod 73 has been disengaged from one of the apertures, and then move the ring 72 along with the handle until the rod again engages a selected one of the apertures. As seen clearly in Figures 6 and 10, the ring 72 carries a cam hump 100 thereon which controls the cutter mechanism to be later described. Consequently, with the aid of the handle 70 this cam hump may be positioned at a desired point so as to control the cutting means to sever the required length of tape strip.

With reference now to Figure 1, it will be seen that the front plate 30 carries a boss 78, indicated in dotted lines, which supports a spool shaft 79 upon which a tape supply in the form of a roll 80 may readily be mounted. The aforesaid strip of tape 58 extends from the roll 80 over a rotary guide member 81 carried by the front plate 30 and which is relatively wide to accommodate tapes of varying widths, and thence over another rotary guide roll 82 mounted adjacent the apex portion of a substantially triangular plate 110. As thus seen in Figure 6, the tape holding arrangement 79 embodies a thumb bolt 83 between which and the tape roll a compression spring 84 is located, this arrangement being adjustable to increase or diminish the tension upon the strip of tape being unwound, as well as accommodating tape spools of varying widths.

In the start of an operation, the free end of the tape strip 58 may be manually applied to the end of the tubing 9 as well as over the edge of the capping member 43, as indicated at 85 in Figure 1. Cutting means to be later described are arranged to automatically sever the tape strip to provide a desired length which is preferably sufficient to pass approximately once around the end of the tubing and the capping member. Of course, there will frequently be a slight overlap at the end of the severed tape strip, and as the term approximately is used herein and in the appended claims, that term is to be construed sufficiently broadly to include an exact meeting of the ends of the severed strip or an overlap of these ends. After the desired length of strip has been severed there will be a loose end which should preferably be held tight substantially until it is actually contacted by one of the roller arrangements 37 so as to insure the clean and tight winding of the tape around the tube end and capping member.

To this end, there is provided an arm 86, Figures 1 and 8, pivoted at one end to the shaft of one of the roller arrangements 37. The other end of the arm carries a free roller 88 over which the tape strip extends. The free end of the arm is connected to a tension spring 89 and the other end of the spring is anchored to a stud 92 carried by the aforesaid plate 110 at a corner thereof. This anchoring of the spring end may be by way of a pin 90 projecting laterally from the stud. After the desired length of tape has been severed, the free end of the tape, bearing in mind that the tape has an adhesive undercoating, by virtue of its adherence to the roll 88 draws the arm 86 against the action of the spring 89 to the position seen in Figure 8 from the position seen in Figure 1. As the roller arrangements 37 travel along the severed piece of tape, it will be noted that there will be a very short end portion of the tape remaining after the tape leaves the roller 88, this portion being so short as not to interfere with a tight and positive winding of the tape around the tube end and capping member. As soon as the tape pulls free of the roller 88, the spring 89 restores the arm 86 into its original position as seen in Figure 1.

The cutting mechanism which severs the desired length of tape from the strip 58 is best seen in Figures 1 and 7. This cutting mechanism is carried mainly by the triangular plate 110 which is pivotally connected near one corner, as seen in Figure 1, to one of the aforesaid shafts 32, which particular shaft 32 extends through the plate 110. Further, as also seen in Figure 1, the bellcrank arm carrying one of the tape applying arrangements 37 and having an end keyed to that particular shaft 32, has the shaft of its cam roller 35 extending through the plate 110, so that this plate must follow every movement of that particular bellcrank arm. Thus, the plate always remains the same distance from the tape applying arrangement 37 carried on the end of that arm, and consequently as the tape applying arrangements 37 are spread apart or brought closer together depending upon the size of the tube being worked upon, the plate 110 maintains its relative position with respect to the applying arrangements. The cutting mechanism includes a rocker arm 91 pivoted to the aforesaid stud 92 carried by the plate 110. On one end thereof the rocker arm

carries a knife 93 for severing the tape strip. The other end of the arm on the other side of the pivot point is connected to a link 94 and the opposite end of the link is pivotally connected to a crank arm 95, the other end of the crank arm being fixedly associated with a shaft 96. A rider arm 97 also has an end fixedly associated with the shaft 96 and at its free end carries a roller 98. The shaft 96 extends rearwardly sufficiently far so that the roller 98 rides along the circumferential surface of the ring part 72, as best seen in Figure 6. It will be recalled that the ring-like member 72 is stationary during operation of the machine, being held in that position by virtue of the engagement of the plunger rod 73 in one of the apertures 76 in the cylindrical portion 13 of the frame, so that the front plate together with its mechanism including the cutting arrangement may move relatively to the ring-like member 72. A tension spring 99, Figures 1 and 7, maintains the roller 98 in contact with the surface of the ring member 72 by virtue of its pull on a free portion of the crank arm 95.

As the front plate 30 rotates during operation of the machine, the entire cutting mechanism is carried along and after a predetermined portion of a revolution, depending upon where the cam hump 100 is set, as above explained by the handle 70, the roller 98 rides over this cam hump. This throws the roller outwardly swinging the crank arm 95 and link 94 inwardly, thus pivoting the rocker arm 91 so that the knife blade 93 severs the strip of tape between the aforesaid guide roll 82 and the roll 88 which maintains the free end of the tape in taut position until the severed portion is wound around the tube and capping member. Immediately upon passing over the cam hump 100, the cutting mechanism assumes its original position and continues its travel with the front plate 30 until the tape winding operation is completed.

It will be understood that when a new tube is placed in position and a new capping member set against the end of it, it is desirable to expand the roller arrangements 37 to permit the positioning of the tube and cap, and in view of the fact that the invention will operate with various sizes of tubes and consequently various sizes of capping members, the means for expanding the roller arrangements 37 must be easy to manipulate so that the rollers may be very expeditiously set against the new tube and capping member regardless of the individual sizes of the latter. With the instant invention, the expanding of the roller arrangements 37 is accomplished merely by a reverse movement of the hand crank 16. Corresponding reverse movement of the spoked wheel 26 with the mechanisms connected thereto including the front plate 30 with its operating parts is prevented by means of a dog-leg pawl 101 attached at its elbow to the end of a pivot shaft 102, the outer end of which shaft has a thumb wheel 103 thereon, as best seen in Figures 2 and 10. This dog is urged by a suitable spring 104 so that its free end rides the inside surface of the rim of the spoked wheel 26. This free end of the dog is positioned to fall into a suitable notch 105 in the rim 27 of the wheel 26 but the notch is so arranged that the dog will not impede forward motion of the apparatus, but will impede reverse motion. Accordingly, when the hand crank 16 is moved reversely the cam plate 23 is likewise moved reversely against the action of the aforesaid spring 41 but the dog 101 holds the other movable parts of the apparatus stationary.

Thus, the roller arrangements 37 are spread apart by virtue of the movement of the cam plate and the rollers 35 riding the slots 25 in the cam plate. As soon as the new tube and capping member have been placed in position, the hand crank may be released and the spring 41 will restore the cam plate to its proper position will all of the roller arrangements 37 tightly engaged against the new tube and capping member.

The pawl 101 also performs another function in that it indicates to the operator the same starting point for each operation. It makes no difference, and in fact at times might prove a better course, if the hand crank is turned several revolutions to provide an ironing effect to the tape wound around the tube end and capping member, one revolution being sufficient for the winding operation. It is a simple expedient for the operator to reverse motion at the end of an operation until the pawl 101 engages the notch 105, and while reverse movement of the hand crank is still permitted as above explained to expand the tape applying arranged rollers 37, there will be a distinctly noticeable difference in pressure, sufficient to adequately indicate to the operator that the starting point has been reached.

It is believed that the operation of the instant invention is sufficiently apparent from the foregoing to warrant only a brief résumé herein. A tube to be capped is first placed in position upon the holding bracket 6. Obviously if the tube is of any material length, other supporting means may be provided for the opposite end or midpoint. An over-sized capping member 43 is locked in position against the end of the tube with the aid of the plunger rod 44. While the capping member is being placed in position, the roller arrangements 37 are held in retracted or expanded position with the aid of the hand crank 16. With the aid of the handle 70 the cam hump 100 may be set at the required position to insure the cutting of the desired length of tape depending upon the size of the tube. As soon as the cap is placed in position, these roller arrangements may be released to be forced into tight association with the end of the tube and the capping member by the spring 41. Then the free end of the tap strip 58 is pressed into engagement with both the tube and the capping member as seen in Figure 1. Sufficient overlap of the tap is provided to form the flange on the outside face of the capping disc as indicated at 61 in Figure 3. The crank handle 16 is then rotated forwardly as many turns as may be desired. During the rotating operation, the roller arrangements 37 press the tape intimately and smoothly over the end of the tube and the capping member, and during this process, the cutting mechanism operates to sever a proper length of tape from the strip.

It will be noted that the machine is highly efficient and rapid in operation, and requires a minimum of labor, and is extremely simple in action. The invention provides a neat, clean-cut capping of a tube in a manner such as to eliminate to a great extent sabotage of the tube, and in a manner to protect the tube by virtue of the fact that shock otherwise occurring against the end of the tube will occur against the oversize capping member. Further, the machine is economical and highly durable.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose

to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a machine for securing an oversize disc to the end of a conduit, means for holding a disc in position against the end of a conduit, a rotatable member, a plurality of rollers carried by said member and shaped complementally to the conduit end and disc, a tape holder also carried by said member to supply tape to be pressed into position around the conduit end and disc by said rollers, a cam member arranged to urge said rollers inwardly against the conduit and disc and also actuate said rotatable member, said cam member having a series of inwardly extending cam tracks, and riders for said tracks associated with said rollers.

2. In a machine for securing an oversize disc to the end of a conduit with the aid of adhesive tape, a conduit support, means to hold a disc in position against the end of a conduit, rotary supporting means, a tape spool carrier on said rotary supporting means, rotary pressers also carried by said rotary supporting means to press tape from the spool around the conduit and circumferential margin of the disc, cutting means arranged to sever the tape ribbon at a predetermined time during the application of the tape, and adjustable cam means for actuating said cutting means and selectively control the amount of tape applied.

3. In a tube capping machine, fixed tube supporting means, resiliently urged but otherwise fixed holding means to maintain a capping member in intimate association with the end of a tube held by said supporting means, mechanism arranged to rotate around the tube end and said capping member, a holder for a tape spool carried by said mechanism, pressing means also carried by said mechanism to press a strip of tape from the spool around the tube end and capping member to secure the capping member to the tube, said pressing means being adjustable to act on tubes and capping members of different sizes, guide means between the spool and said pressing means to guide the strip being unwound from said spool, and means to selectively limit the amount of tape unwound from the spool.

4. Tube capping apparatus, including rotary means arranged to circumscribe a tube end and capping member, a tape spool carried by said means, guide rollers also carried by said means and over which the tape strip emanating from said roll is trained on its way to the tube end and capping member, cutting means to sever a required length of tape from the strip, and one of said guide rolls being resiliently biased so as to yield with the severed tape portion and maintain the free end portion taut until approximately the time it is engaged with the tube end and capping member.

5. Tube capping apparatus, including winding means arranged to wrap a strip of adhesive tape around both a tube end and capping member, pressing rolls associated with said means and biased towards the tube end and capping member to press the tape intimately thereagainst, means for rotating the pressing rolls around the tube end and capping member, and stop means limiting a reverse movement of said rolls to a definite starting position but permitting forward motion to any desired extent.

6. Tube capping apparatus, including rotary supporting means, spaced presser rolls carried by said means to bear against a tube end and capping member and press a strip of adhesive tape into intimate association therewith, cam riders associated with said rolls, a cam member having inwardly directed and arcuate cam tracks bearing against said riders arranged to drive said rotary means by virtue of a camming action against said rolls tending to urge the same into tight engagement with the tube end and capping member, and selectively operable means to move said cam member relatively to said rotary means to move said rolls outwardly for the positioning of a new tube and capping member.

7. Tube capping apparatus, including rotary supporting means, a tape supply carried by said means, a cutting element carried by said means to sever a requisite length of tape, presser rolls biased toward a tube end and capping member to press the tape from said supply into intimate association with the tube end and capping member, and guide means for a strip of tape also carried by said rotary means mounted to travel with the free end of tape being applied and arranged to automatically hold the free end of a severed tape portion until approximately the time such free end is acted upon by one of said rolls.

8. Tube capping apparatus, including means to hold a capping member against the end of a tube, a rotary member, a plurality of members carried by said rotary member and each pivoted adjacent an end thereof, a presser roll carried by the free end of each of said pivoted members and shaped complementally to the tube end and capping member, a rider on each of said pivoted members intermediate the ends thereof, a rotary cam element having an arcuate track extending generally toward the axis of rotation for engagement with each of said riders, and means to rotate said cam member, said cam member urging said rollers inwardly against the tube end and capping member and driving said rotary member when turning in one direction and releasing said rollers when turning in the opposite direction.

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