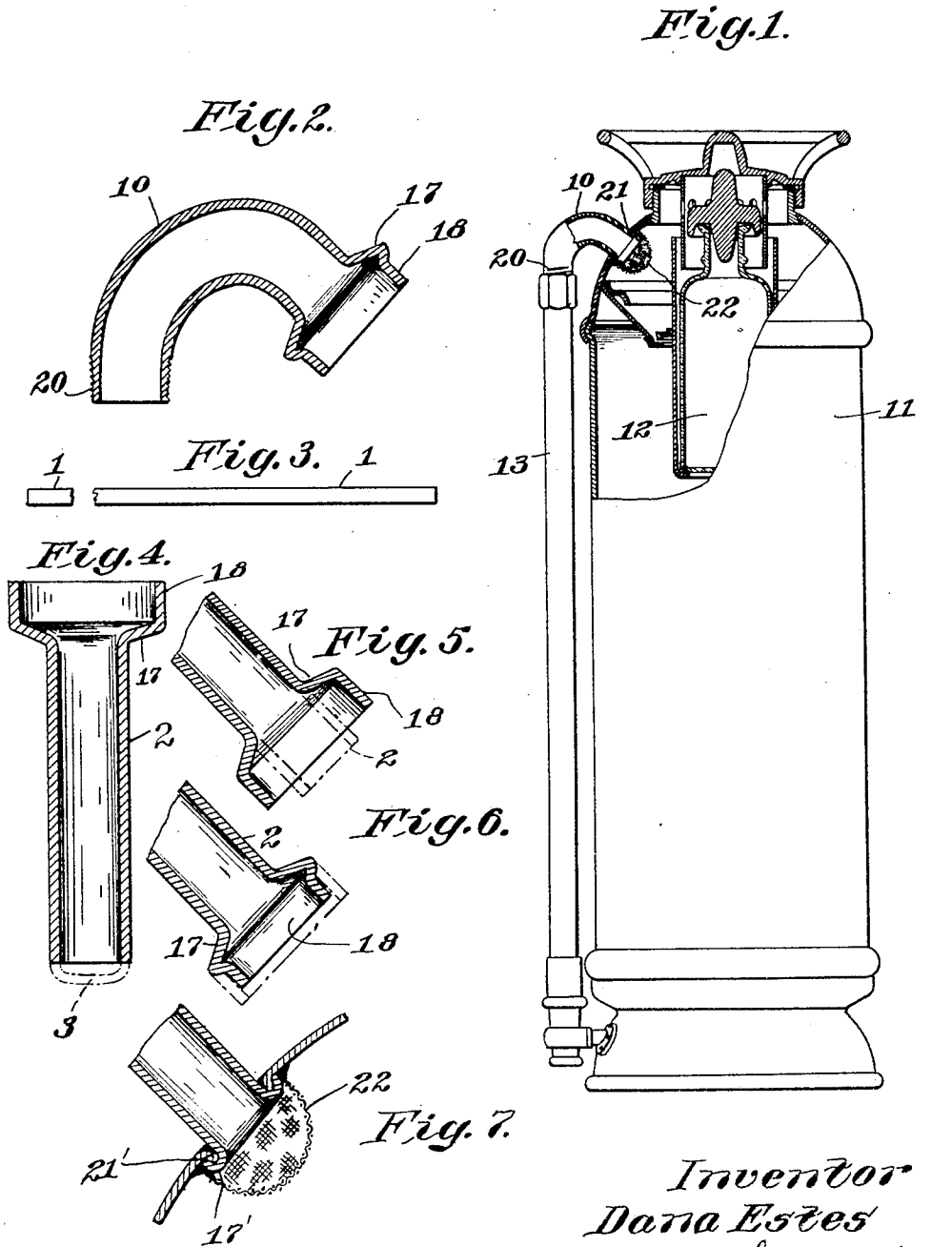


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FIRE EXTINGUISHER AND METHOD OF MAKING SAME.
APPLICATION FILED JULY 3, 1919.

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UNITED STATES PATENT OFFICE.

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FIRE-EXTINGUISHER AND METHOD OF MAKING SAME.

1,396,362.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DANA ESTES, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Fire-Extinguishers and Methods of Making Same, of which the following is a specification.

This invention relates to improvements in fire extinguishers and method of making the same. More particularly it relates to portable chemical fire extinguishers in which acid is thrown into a soda solution at the time of use. Apparatus of that general type, as at present very extensively used, comprises a metallic cylindrical tank which when charged and ready is mostly filled with the soda solution but contains the acid in a bottle in its upper part and is required, as a measure of safety, to be able to withstand a pressure of several hundred pounds per square inch, relief of which is found only through a continuously open curved outlet. It is commonly considered that the outlet is necessarily curved because it must direct the hose downward close by the cylinder when the apparatus is waiting for use; and springing from a dome-shaped end it must convey the fluid through a change of direction of 120° more or less. This curvature, however, has interfered with the perfection of the apparatus, and has also been a cause for disproportionate expense, owing to the roughness of the passage and the occasional occurrence of elbows, which hitherto have always been made by the metal casting art, that are choked or that have some wall too thin, so that an appreciable percentage of completed extinguishers fail when tested, owing to defect of this elbow. As it is not practicable to test the elbows independently, and as the disruption and reconstruction of the completed extinguisher to replace a defective elbow is relatively expensive the defective elbows add materially to the costs of manufacture; in addition to which the excessive friction of even the perfect ones, owing to their characteristic roughness as hitherto manufactured, materially diminishes the freedom and power of the discharge of the fire extinguishing fluid. The nature of the difficulties has been well known, but owing to the curvature of the elbow it has not been

possible to work the interior surface to smooth it with a tool; nor to test it for aberrations to determine the thickness of its walls at all points, which is really uncertain, owing to the danger that displacement of a bit of sand in the mold, or in the core, may have occurred when the metal was poured. The present invention eliminates all of these uncertainties, difficulties, expenses and losses by an extremely simple device. The idea is to make the hole straight, in which form it can easily be made perfect as to symmetry and smoothness, and then to bend the whole to the desired curvature. And as the metal ordinarily produced by casting processes cannot be thus bent the further step is taken of starting with a tractile disk of uniform thickness and known imperviousness, and shaping it into a straight tube somewhat as a cartridge shell is made, and then bending it into the needed arc-form. Either before or after this bending the two ends of it are fashioned according to need. The idea of forming the curved tube first as a straight tube permits of its manufacture with a high degree of accuracy as to smoothness of interior wall and as to uniformity of thickness of wall because it permits of the making of this part of the wall with the precision machinery of the die and metal drawing art. The method of the invention may be performed in several different ways, as will be understood by those familiar with that art, one of which is illustrated in the accompanying drawings. Another might be, to start with a seamless metal tube, instead of a disk; this being permissible, unlike a cartridge, because in the present case neither end need be closed. It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings:

Figure 1 is an elevation of a fire extinguisher embodying the invention, with a fragment of the exterior casing broken away;

Fig. 2 is a sectional side view on a larger scale of the particular elbow which forms the subject matter of the invention;

Figs. 3-6 show diagrammatically the successive stages of the manufacture of the elbow of Fig. 2; and

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Fig. 7 shows an alternative form of the flanged end.

The elbow to which the invention especially pertains is shown in the accompanying drawings at 10, where it constitutes a part of a portable fire extinguisher, comprising a canister 11 adapted to hold a soda solution, a bottle 12 arranged so that acid within the bottle will run out into the soda solution whenever the canister is inverted, and the hose 13 through which the water thus charged with gas is expelled and projected upon the fire. Underwriters' requirements are strict that the hole through the elbow should have clear a certain specified diameter, and should be surrounded by walls of a certain minimum thickness, in order to function properly and to withstand sufficiently under the high pressures that may possibly be generated in any extinguisher. It is a feature of the invention that, first, this hole and thickness of metal are made positively by dies in a straightaway direction, and second, that after being thus perfected they are formed into the arc by bending. To this end, a disk 1 of suitable thickness may be taken as the blank or beginning of the process, and may be formed by dies, after the manner of metal drawing processes, into a deep cup 2 whose bottom 3, the place of which is indicated by the dotted line of Fig. 4, is subsequently cut off. The walls of this cup are of the requisite thickness and uniformity of metal and diameter of hole for the elbow 10, with smooth interior. Having been so formed, this tube may then be bent into the desired shape by any suitable method of bending. Before or after this bending occurs, one end of the tube, illustrated as that which was not stretched in forming the cup, may be further formed by dies so as to constitute the flange 17 and a tubular projection 18; and the other end may have a thread 20 cut upon it to receive the metallic coupling which is to connect it to the flexible hose, or may be otherwise shaped as desired.

Instead of starting with a disk of metal as the stock, the method here described may start with seamless brass tubing, in which case the closed cup end indicated by the dotted lines in Fig. 3 never exists, so far as the method under discussion is concerned, and it is only necessary to provide at one end of the tube for forming the flange 17 and tubular projection 18, before or after bending the tubing, and at the other end the screw thread 20.

The elbow thus constituted may be associated with other elements of the fire extinguisher by having its curved and threaded tube projecting through the hole 21 in the dome of the canister till the flange is seated or bearing against the interior thereof. As the dome is ordinarily of spun brass, and

the forward face of the flange which presses against it is capable of being made very precise in shape by the method of the invention, an accurate fit of these two results, with such smoothness of opposing surfaces that the two can be well connected by solder without such a large quantity being required as may be in danger of overflowing into the end of the tube even though there be no projection 18. It will be understood that the projection 18 is for the purpose of holding a hemispherical screen 22 which may be soldered to the exterior of this projection; but that if preferred this projection may be omitted and the screen may be secured across the entrance to the tube by attachment to the adjacent metal of the dome.

In the product thus resulting, the tube can be made with such accuracy of dimension that it can, if desired, be made with a much lower factor of safety, and thus be smaller in diameter; which in turn would make the process of drawing the metal cheaper, and require less metal. The new construction also improves the efficiency of the extinguisher by eliminating largely the friction and eddy currents, which affect the outrushing stream of liquid, caused by the rough and pitted surface of cast brass, unsmoothed by tooling, over which the liquid has to flow at high speed through the curvature of 120° or so in apparatus made according to the practice which has prevailed heretofore. In the process of the invention the drawing of the interior surface of the tube over the mandrel, or the pressing thereof by the interior member of the die, amounts to a tooling of the interior surface of the metal and is so referred to in the appended claims. In the bending stage of the process, the flange may serve as a convenient means for holding the tube to promote the accuracy of the bending operation without injury to the tube.

Fig. 7 illustrates at 17' a different shape of flange, somewhat simpler in construction, and providing a different surface to which the screen 22 may be soldered.

In this case the edges of the hole in the dome are turned in and afford a strong rim as indicated at 21'.

I claim as my invention:

1. A method of making a curved tank outlet comprising the formation of a straight tube with its final degree of interior smoothness, followed by the bending of the tube from straight to curved formation.

2. A method of making a curved tank outlet comprising the drawing of metal by dies into a straight tube and afterward drawing the tube into the final curvature.

3. A method of making a curved tank outlet comprising the formation of a tractile straight tube with smooth interior, having an integral flange at one end, and bending

the tube from straight to curved form, by drawing from said flange as an anchorage.

4. A new article of manufacture comprising an outlet tube for a tank having a part adapted to be rigidly secured within the tank, and a part outside of the tank, said outside part comprising a tube of drawn

metal, smooth interiorly and having the metal of said smooth portion curved away from the direction which it has at said rigidly secured portion.

Signed at Boston, Massachusetts, this 28th day of June, 1919.

DANA ESTES.