

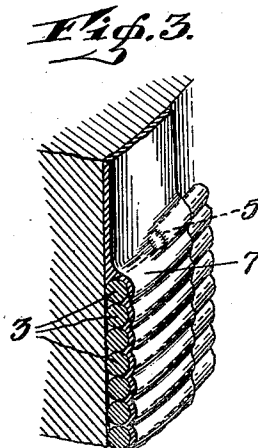
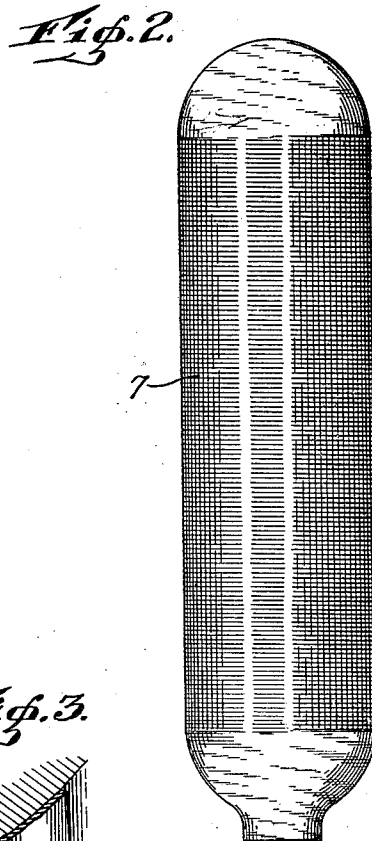
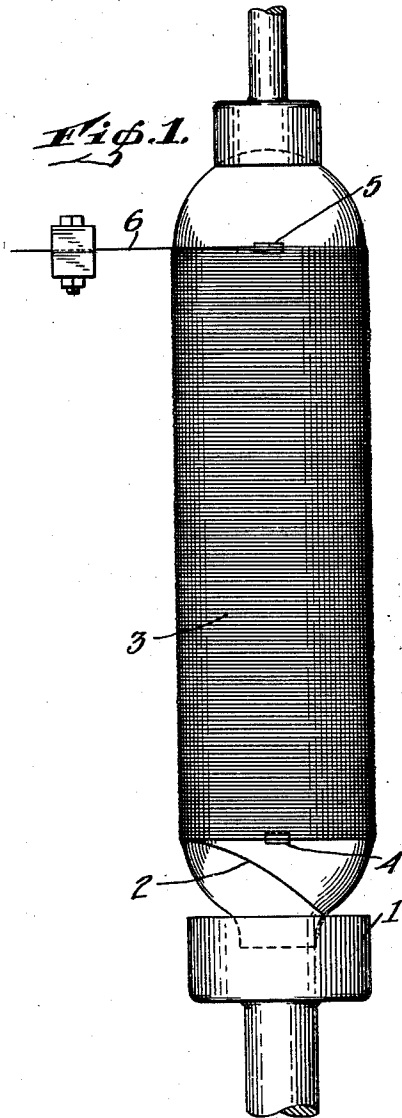
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PROCESS OF MAKING REINFORCED GAS FLASKS

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PROCESS OF MAKING REINFORCED GAS FLASKS

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1 Claim. (Cl. 29—148.2)

The invention relates to containers or flasks for holding gases under pressure, such as liquid CO₂, oxygen, etc., and includes a new method of applying wire wrappings to such flasks to increase their strength and render them proof against fragmentation if struck by missiles in warfare, also the flasks so made.

It is already known to reinforce gun barrels, gas flasks and the like in this manner. The usual operation is to wind the wire on the flask by rotating it like a spool or bobbin, laying the successive spires close together or in contact and thereafter covering the wrapping with a coating of metal, which is done by dipping the wrapped flask in a molten bath of tin or other suitable metal or alloy. The coating locks the spires on the flask making a container of great strength in proportion to its weight. The wire is of high tensile strength, sometimes called music wire, and is difficult to handle on account of its stiffness on which account the process of making a neat wrapping with neatly finished terminations is difficult and time-consuming.

The practice is to affix two circumferential flanged rings to the cylindrical flask body before starting the winding, one near each end. These are to serve as the limiting boundaries for the wrapping and as anchorages for the two ends of the wire, to hold them until the flask can be dipped. They are usually made as split rings of L-shaped section and appropriately attached to the chucks of the winding machine to retain the positions on the flask to which they have been set. The winding is started by passing the beginning end of the wire through a hole in one of the flanges and then rotating the flask so as to wind on the wire up to the flange of the ring at the other end. When this is done and while the wire is still held under its strong winding tension the flanges are turned down over and upon the adjacent spires of the wire so as to clamp it against uncoiling or slipping. A loosely wound wrapping is not an effective reinforcement. The wire ends are then trimmed off and the flanges spun down over the spires to make a neat job, whereupon the flask is dipped in the molten bath to complete the operation. The flanges serve no purpose, except to determine the beginning and end of the wrapping and prevent uncoiling until the dip-coat can be applied, and although after dipping they become integral parts of the flask covering, being of soft metal or brass, they add little to its tensile strength. They are in fact easily subject to injury resulting in a loose wire end.

By the present invention the wrapping process is so simplified and shortened that the job can be completed in about one-half of the least time heretofore required, and on a regular quantity production basis, and without sacrifice of any advantage; in fact, it is done with some saving of material since the applied flanges are not used.

The new process is illustrated diagrammatically in accompanying drawing, Fig. 1 showing the flask wrapped and the ends of the wire anchored, ready to be prepared for dipping. Fig. 2 illustrates the completed flask, and Fig. 3 a fragmentary, greatly enlarged scale section of a wrapped and coated flask.

According to this invention, instead of passing the beginning end of the wire through a hole in an applied flange, when starting the winding, I clamp such end directly in the chuck of the winding machine, by which the flask is gripped to be rotated. This makes the chuck a temporary anchorage for starting the winding. By the action of the machine which rotates the chuck and flask, the wire is then wound quickly over the neck part of the flask as indicated at 2, continued on over the cylindrical body of the flask in the usual way and, as indicated, down to the opposite end where the wrapping is to terminate, usually at the base of the cylindrical part.

Then, with the machine stopped and, while still retaining the winding tension in the wire, the terminal spires of the winding at each end are fastened or anchored to the flask by brazing a few of them together, as indicated at the points 4 and 5, and by means of a brazing or soldering alloy specially selected for the purpose.

The special feature of this alloy is its fusion point, which is enough below the critical temperature of the alloy steel of which the flask wall is made that it can be used to make the wire junction without imparting a temperature to the steel wall which exceeds or dangerously approaches that temperature. Different steels have different critical temperatures but all of those used for flask manufacture are unaffected by locally applied temperatures lower than 1250° F. At the same time the fusion point of the brazing compound is sufficiently above the temperature at which the bath of dipping metal is maintained, that once the junction or anchorage of the terminal spires has been accomplished, such junction will not be thereafter impaired or weakened when the wrapped flask is dipped. The bath temperature need not exceed, say about 600° F. at which point tin and its alloys are sufficiently fluid for effective coating results. Suitable braz-

ing compounds, including in this term hard or silver solders, are available on the market.

A strip of such a compound fusible within the range indicated, say at 1175° F., is slipped under or laid on top of a few of the terminal spires at each point 4 and 5, and then melted by the localized application of heat, as by a hand-torch, an electric arc or more conveniently, the tongs of an induction heater, thus permanently anchoring the two ends of the wrapping wire in position. The heat applied for this purpose is momentary, and even though it might involve a temperature somewhat above the indicated fusion range, is always safely below that which might alter the crystal structure of the alloy steel of the flask to affect its strength.

The next steps involve the release of the tension on the lead 6 of the winding wire and the cutting off of the wire ends close to each anchorage point, 4 and 5, and finally the dipping of the flask in the molten bath of tin or other coating metal.

The flask then appears as indicated in Fig. 2 with the wrapping wire 3 completely coated, and each cut end of the wire covered over and concealed in the metal coat. This is indicated, greatly magnified, in Fig. 3; actually the end of the wire is practically invisible, its diameter being usually in the order of .034 inch. Since the wrapping thus made has no spun-over flanges at its ends the overall flask diameter has not been increased by the winding process greater than the thickness of the wire and its thin tin coat 7, and the flask is therefore virtually unchanged from its original dimension.

While it is, of course, apparent that the winding could, if desired, be continued to cover the

flask with a second reversely-wound layer overlying the first, in the same manner, this is not necessary if a single wire of appropriate diameter is tightly wound and securely anchored prior to dipping. The process described safely avoids the risk of wire-slipping during the coating operation, and equally important, during the handling of the flask while being transported from the winding department to the dipping department. After dipping, the risk of slipping is of course over.

I claim:

The process of producing wire-wrapped flasks of heat-critical steel which comprises setting the flask between chucks in a winding machine whereby it can be rotated on its longitudinal axis, fastening the end of the wire to the machine so as to lay the wire against the surface of the flask in the position of the initial spire of the winding to be wound thereon, rotating the flask to wind the wire around the same under tension and so as to envelope the flask with the winding, anchoring the initial spires of the wire to the flask wall by brazing a few of them together by means of a brazing alloy having a fusion point well below the critical temperature of the flask steel and using the brazing heat so momentarily as not to produce a temperature in the flask wall exceeding such critical temperature, anchoring some of the last wound spires of the wire to the flask wall in the same manner as above prescribed for the initial spires, cutting off the free ends of the wire beyond the brazed spots and then dipping and coating the wound flask in a molten metallic bath while maintaining such bath at a temperature lower than the fusion point of said brazing alloy.

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