W. PRATT.

Lamp.

No. 18,704. Patented Nov. 24, 1857.

Fig. 1,

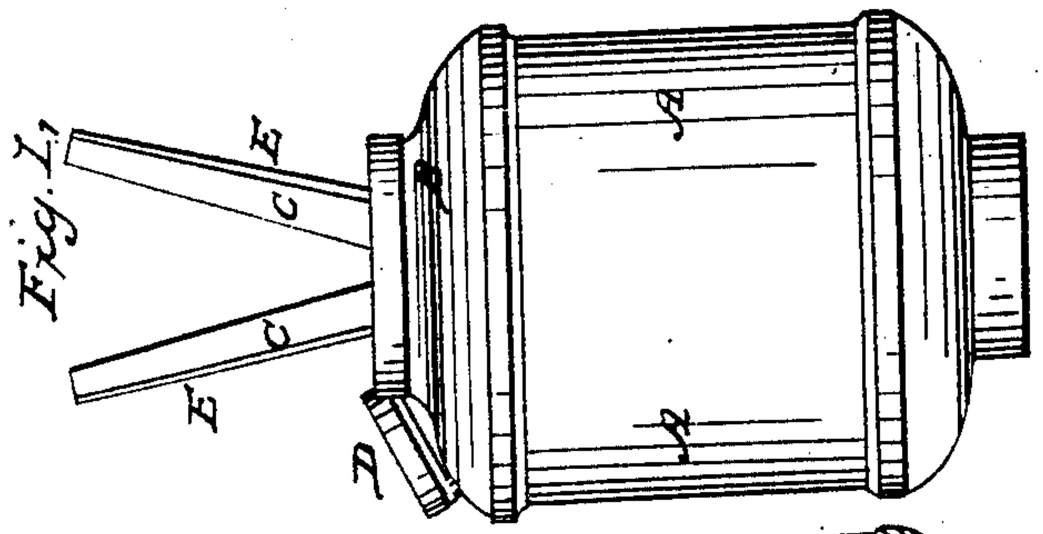


Fig. 2.

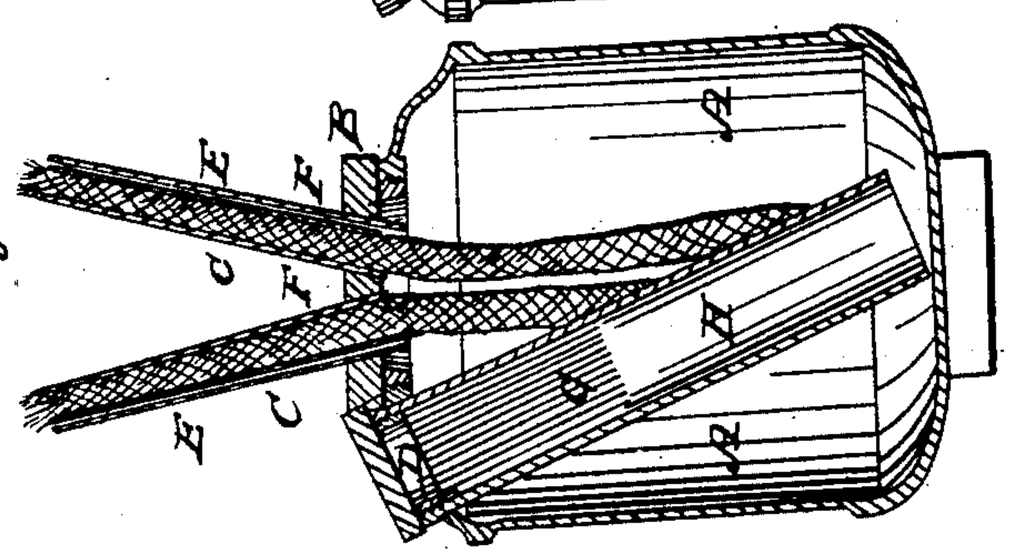


Fig. 6,

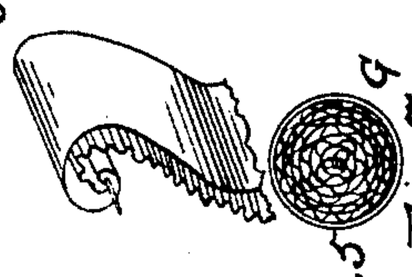


Fig. 5

Fig. 7.

Fig. 8,

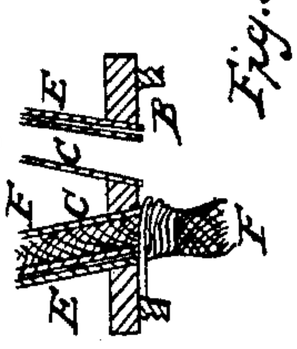


Fig. 3,

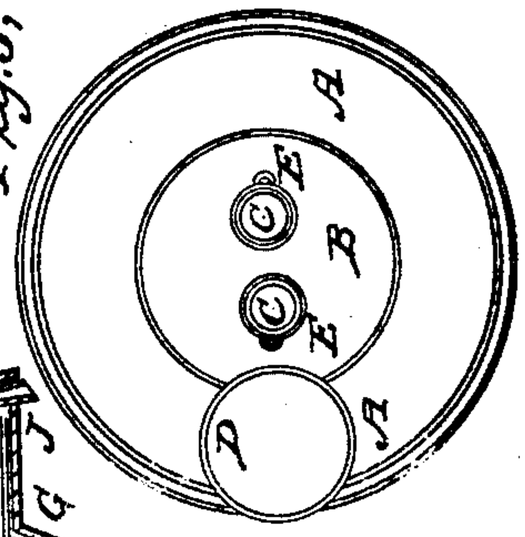
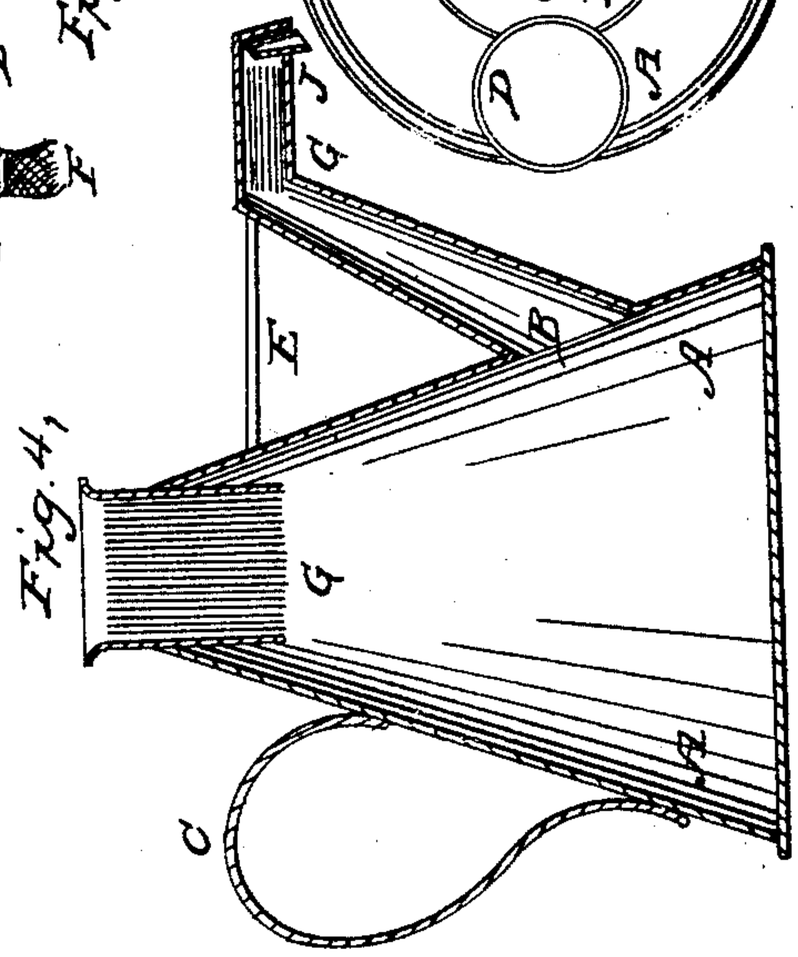


Fig. 4,



WITNESSES!
B. F. Coy
E. Wentworth

UNITED STATES PATENT OFFICE.

WILLIAM PRATT, OF BALTIMORE, MARYLAND.

SAFETY-LAMP.

Specification of Letters Patent No. 18,704, dated November 24, 1857.

To all whom it may concern:

Be it known that I, WILLIAM PRATT, of the city of Baltimore and State of Maryland, have invented certain improvements in vessels used in holding, pouring, and burning inflammable liquids, as alcohol, spirits, and the various hydrocarbon liquids used in illumination, the object of which invention is to render all such vessels safe from explosion when accidentally ignited; and to enable others to make and safely use my invention I give a general and particular description, illustrated by the drawings and letters of reference, which form a part of my specification.

General description.—I form the orifices of reception and delivery in all vessels used for the above named purposes in such a manner as shall make them practically to consist of a cluster of fine tubes of great length as compared with their diameter, so that they may be made so economically as to allow of general use, to have sufficient substance to rapidly conduct off the heat of a flame kindled upon their orifices without igniting the inflammable matter contained within the vessel, or impairing the protective power of the attachment by burning or melting the solder which confines it in its place. And at the same time to allow freely pouring the liquids through, and not become inoperative from the gumming up of the interspaces by the resinous matter which is contained in most burning fluids. And in order to carry out all these requirements without the labor and expense of making a cluster of separate small tubes which would have the same effect, I fill the orifices which receive and deliver the liquids, with a volute of metal, so made that it fulfils all the before mentioned conditions. We now come to the vessels used in burning these liquids, for the latter are not safe unless used in conjunction with the protected vessels for holding and pouring. From a record of the published accidents which from time to time appeared, I found them attributable to three several principal causes. First, the explosion of the filling can, or lamp, or both, by attempting to fill the lamp, while burning, showing conclusively that both vessels must be protected. Secondly, the spontaneous explosion of the lamp from the accumulation of gas in its top, which gas is always generated after the lamp has been a little while lighted, and which is very rapidly evolved when it is in a heated room. Thirdly, the explosion of the lamp from the dropping of the wick from the wick tube on accidentally jarring the lamp, especially where the wick does not quite tightly fill the tube. I found it necessary, therefore, to a complete system of safety, not only to protect the filling vessel, but to provide against all these contingencies in the lamp. I therefore construct the lamp with a protective orifice to receive the inflammable liquid, and by suitable devices to prevent the wick tube cap from being accidentally or inadvertently taken off, until the protected orifice is first uncovered; to remove or conduct off the accumulating gas in the top of the lamp as fast as generated, and without loss of illuminating power in the liquid; and also to prevent the dropping of the wicks from their tubes on accidentally jarring the lamp; and again to prevent so large a quantity of the fluid from running out if the lamp should be accidentally overturned while the cap of the protected orifice is removed, and to do this I generally construct my lamp as follows. A side feeder is placed in the lamp in such position relatively to wick tube cap, that the peripheries of the two caps shall intersect; the cap of the feeder fitting into a recess in the wick tube cap, or abutting against a stop projecting from it. The tube of the side feeder reaches nearly to the bottom of the lamp, inclining toward its center, which arrangement prevents any large quality of liquid from being spilled or upsetting the lamp. The orifice of the side feeder is filled with the volute from about one quarter of an inch below its cap, extending downward from three quarters to one inch; through this the lamp may be filled with perfect safety, for if both lamp and feeder or can accidentally ignite, a harmless flame is the only result, and the liquid may still be poured through this flame without the least danger of an explosion, and if this is left to itself it soon expires of its own accord. To prevent the accumulation of gas in the top of the lamp without loss of the illuminating product, I make a small tube by the side of the wick tube running through the cap and terminating at the flame of the wick. This tube serves also the double purpose of allowing the lamp to be filled when the liquid rises above the lower end of the side feeder tube by permitting the escape of the air. A small spring or coil of wire soldered to the

under side of the wick tube cap with the coil or helix directly under the tube, through which the wick is drawn, effectually prevents the dropping of the wick or jarring the lamp.

Description of the drawings.—Figure 1 represents the top of a common metal lamp, in side perspective, A, A, being the body of the lamp, B the central or wick cap, containing the wick tubes C, C, and the side tubes E, E, for conducting off the gas, and allowing the escape of air on filling. The wick tubes are of ordinary size. The side tubes E E are about $\frac{1}{30}$ of an inch internal diameter. D, is the screw cap of the side feeder, and the drawing shows the intersection of the two caps in their peripheries, to prevent the accidental unscrewing of the wick cap, and thereby exposing the unprotected orifice which is covered by it.

Fig. 2, shows the lamp in section; H, H, the side feeder tube, the diameter of which should be from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. The volute is placed a little way down from the top of the tube, as shown in the drawing. G represents this volute and its proper position in the tube. F F are the wicks. The other parts being the same as in Fig. 1, it is not deemed necessary to describe them more particularly.

Fig. 3, is a view of the top of the lamp, showing the relative position of the parts, marked with the same letters as in Fig. 1.

Fig. 4, shows a can or filling vessel one-third the actual size. A, A, the body of the can, B the feeding nozzle, C, the handle, G, G, the volutes or safety attachments at the orifices of reception and delivery. E is a brace running from the spout to the body of the can. The orifices G G should be about one inch for the larger, and $\frac{3}{8}$ of an inch for the smaller one. J is a tube about $\frac{1}{8}$ of an inch diameter in the closed end of the nozzle to prevent dripping.

Fig. 5, shows in top section the orifice of the side feeder tube and volute, as I prefer to make it. I take any suitable thin sheet metal, as tin plate, copper, zinc, brass or Muntz's metal, and pass a strip about one inch in width through a pair of toothed rollers, the teeth meshing into each other, or between dies with teeth raised upon their surfaces. The corrugations should be about one twentieth or one thirtieth of an inch in width and depth. With the piece of metal thus rolled or stamped I place a strip of the same width of plain metal; laying their ends together, I solder them to a small brass wire or tube and roll them tightly upon the wire or tube till a volute of sufficient size to fill the orifice for which they are intended shall be formed. This is cut off and slipped into the tube and then soldered, and however long a flame accidentally kindled upon the end of this is permitted to burn, it can never melt the solder, burn the volute, or ignite the combustible matter within the vessel.

Fig. 6, represents a strip of plain and a strip of corrugated metal soldered to the wire preparatory to winding them into form.

Fig. 7, shows the edges of the plain and corrugated strips, and how they form tubes when laid closely together.

Fig. 8, represents a wick tube cap or section, with the helical spring soldered to its under side, to prevent the jarring of the lamp from throwing the wick from its tube.

General remarks.—In constructing these various appliances for the safety of vessels used in the purposes above described I do not confine myself in every particular to the exact details as shown in the drawings and specifications, for it is obvious that the results may be attained by means which though not identical are analogous, and strictly equivalents—but I have shown that which I consider to be the best and most simple method of producing the desired effects. For instance a volute of plain metal not very tightly wrapped would be safe, but the folds would be liable to derangement, and they will not allow the liquids to run through so freely and would easily become clogged by gumming; or a single strip of corrugated metal wound around itself would form sufficient protection, but the corrugations in some parts will sink into each other and in other portions would by the raised parts falling together form the tubes of too large a size. Again, the metal forming the volute may be made thicker, and ribs raised upon its surface and this rolled up forming a channeled protection, or still again, the volute may be formed by winding a fine wire around a small central arbor in the form of a helix and when a coil of sufficient length has been formed to fill the orifice, and this coil and so on till a volute of sufficient size has been found to fill the orifice, and this though likewise protective, is still liable to the objection of not permitting so free a passage of the liquids through it, and also the defect of gumming and becoming partially inoperative. But I have found from experiment that the method of making the volute of one strip of plain, and one strip of corrugated metal, to be the most economical and one which has no practicable objections.

In the arrangement of the feeder and wick caps the peripheries of the two instead of intersecting, may be placed farther apart; and a stop upon the central cap, abutting against the side feeder cap, when both are tightly screwed down, will prevent the accidental explosion of the unprotected orifice. Another method of arranging these parts would be to place the volute and its cap upon the central or wick tube cap, leaving the tube of the volute about $\frac{1}{8}$ of an inch above

the surface of the cap, a ring fitted around this part of the tube with a pin projecting from its under side sufficiently long to reach through a hole in the edge of the wick cap, and to abut against a stop soldered to the main body of the lamp, so placed that this hole shall be just past the stop when screwed tightly down, would, by being confined in place by the feeder tube cap, prevent the exposure of the central orifice either through ignorance or carelessness. Another arrangement of the parts is to make the central cap to consist of two screws fitting concentrically into each other, and into the top of the lamp. The wick cap is provided with a long cylinder sufficiently large to contain the wicks, the cylinder sliding up and down in the center of the volute, which in this case is wound around the wick cylinder, and fills the space between it and the circumference of the screw which fits the lamp top—the lamp to be filled by raising up the upper cap and screw with its cylinder, sufficiently high to pour the liquid through the volute. I have tried all these plans but have found none so simple as that which I have particularly described, and shown in the drawings.

The application of the safety attachment to vessels holding large quantities of inflammable liquids, from which it is exposed by drawing therefrom with lamp or candle lights, is very simply made by attaching a tube containing a volute of larger section than the orifice of the stop cock, so that when soldered upon it, it shall not impede the free delivery of the contents of the vessel.

I do not claim to be the originator of a safety attachment to vessels using explosive and inflammable substances, for many devices to this end have already appeared, as Newell's safety wire gauze tubes, tubes of tin covered with wire gauze, chambers of perforated tin, and cylinders of the same, filling vessels with shot, or pumice stone, or sponge, all of which in practice have been found defective. I claim superiority over all. First in simplicity and durability of structure and economy of manufacture. Secondly, the great body of metal in my device prevents deterioration by corrosion, destruction by heat, or the melting of the solder which holds it in place, all of which I have seen in the wire gauze attachments, the meshes of which to be safe must be necessarily fine, and these act as capillaries in conducting the fluid to the surface, which if accidentally ignited burns with a fierce hot flame, destructive of the gauze—the same cause also causes its deterioration by corrosion or renders it inoperative from gumming up if suffered to be a little season in disuse, preventing thereby the pouring of the liquid through it.

I am also aware that a perforation in the lamp cap for allowing the escape of the accumulating gas, has before been made, but while this involves a loss of from 15 to 20 per cent. of the illuminating liquid mine is equally safe, and applies the gas to the support and increased brilliancy of the flame.

I am aware also that Mr. Hemming applied to the oxyhydrogen or compound blow pipe packages of wire in a long tube and tightly wedged therein; the conducting power of the metallic channels preventing the passage of flame through them; and in my early experiments I tried the same device, but found the practical defects so great as to render it useless for my purposes. First the wires presented so much solid material in proportion to the interspaces between them, that liquids only slowly percolated through instead of running freely through them, especially after a short period of disuse when they became fouled or gummed up. I tried loose packages of wire but they were unsafe from dropping out. I then twisted them but found that although it decreased or obviated the latter defect, it made greater the first one, that of freely pouring through them. Wire gauze has been applied to cases, but the same defects, arising from burning of the meshes, melting of the solder, corrosion of the gauze, and fouling or gumming up from resinous matter, obtains in this application as well as in the lamps.

I am aware of the existence of Nickols' safety valve can but it differs so entirely from mine that I will only remark that while his device requires some degree of presence of mind in the person exposed, mine as a principle of safety is inherent in the method of construction and arrangement, for if both lamp and can accidentally ignite, no explosion can take place; and a feeble and manageable flame through which the liquid may be still and safely poured is the only result.

I have discussed this subject more fully perhaps than the law requires to set forth the nature of the invention. But the great number of terrible and fatal accidents which have taken place, and which no amount of warning seems to lessen, has prompted me to explain the whole matter clearly and thoroughly in order that all inflammable liquids may be as safely used as possible. While therefore I do not claim any of the devices of others which I have referred to in the foregoing specifications, or profess to be the discoverer of any of the principles, involved is my own devices, (separately considered) I do claim specifically as follows in accordance with the title of the invention and foregoing descriptions—is illustrated by the drawings.

1. I claim protecting the orifices of vessels, used in holding, pouring, and burning inflammable liquids, with a volute of ribbed metal wound upon itself; or made of strips of plain and corrugated metal wound together—these so formed making most economically a series of regular tubes, of great stability and conducting power, together with freedom of pouring through them the liquids used; and also presenting great facility of cleaning from any accidental obstructions. In claiming the above, I do not claim protecting such orifices with "wire gauze," "perforated metal," "cylinders" or "chambers," "packages" or masses of "shot," "pumice stone," or masses of "tangled wire" or of "wire packed longitudinally in tubes," as all these devices have been known before—but do not fulfil all conditions which my device does.

2. I claim the arrangement of the feeder tube and cap and the wick tubes and cap, either by the intersection of their peripheries, or stops suitably placed in such a manner that the removal of the wick cap cannot take place, till that which covers the protected orifice for replenishing the lamp is first taken off.

WILLIAM PRATT.

Witnesses:
B. V. Coy,
E. Woodward.