(No Model.)

A. E. SMITH.

APPARATUS FOR RETARDING CONGELATION OF FLUIDS.

No. 545,104. Patented Aug. 27, 1895.

FIG. 1.

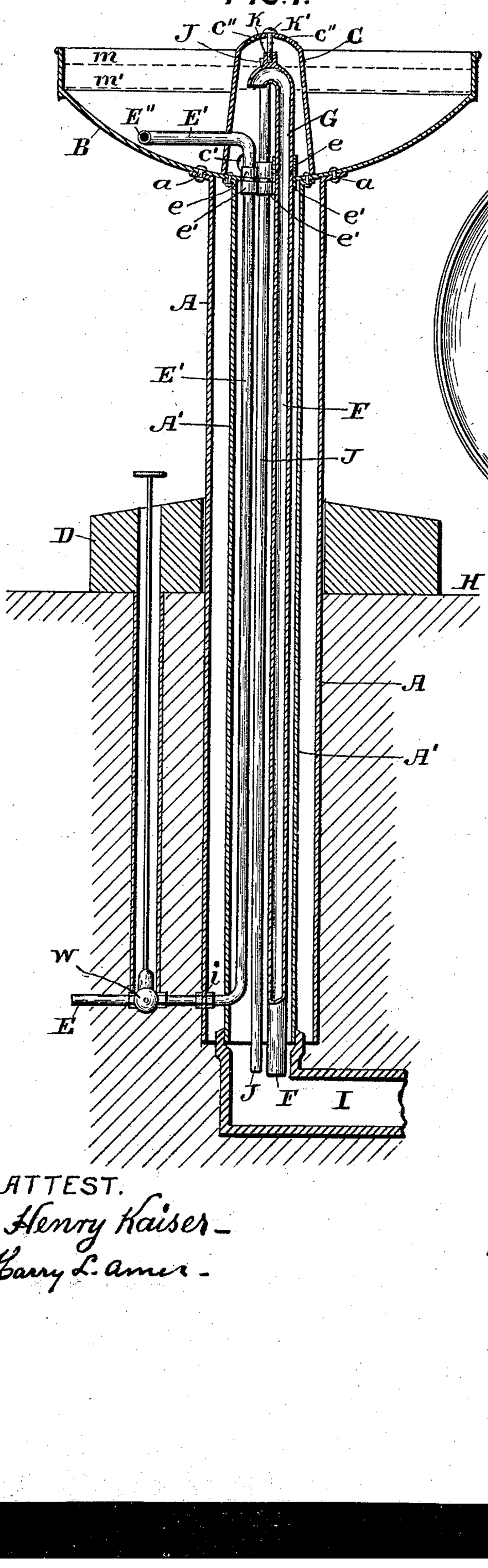
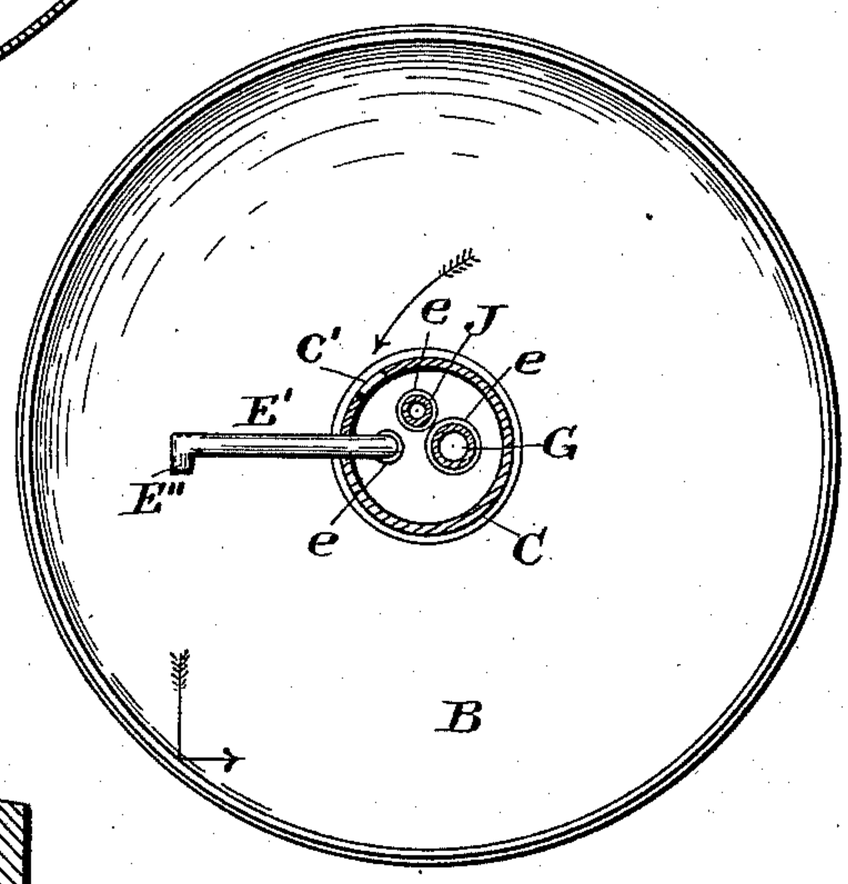


FIG. 2.



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APPARATUS FOR RETARDING CONGELATION OF FLUIDS.

SPECIFICATION forming part of Letters Patent No. 545,104, dated August 27, 1895.

Application filed March 28, 1895. Serial No. 543,533. (No model.)

To all whom it may concern:

Be it known that I, ARNOLD E. SMITH, a citizen of the United States of America, and a resident of Ogdensburg, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Processes of and Apparatus for Retarding Congelation of Fluids, of which the following is a specification.

My invention relates more especially to watering-troughs for animals, where such troughs are exposed to freezing weather, but it may also be used to retard or prevent congelation of any fluid in receptacles where, under the circumstances in which placed, it would otherwise congeal; and it consists in an improved apparatus for keeping in motion a body of fluid in the receptacle provided therefor, by means of the warmer supply-fluid, and abstracting from such receptacle the cooler portions of such fluid, as will hereinafter be more fully described and claimed.

Reference being had to the accompanying drawings, in which like letters of reference indicate corresponding parts throughout the several views, Figure 1 represents a sectional elevation of my invention as applied to a watering-trough for horses. Fig. 2 represents a plan view of the basin or reservoir of the same with the drainage-cap and its included parts (except the supply-pipe E′, which is shown in full plan) horizontally sectionalized immediately above the center of the aperture *c′* in Fig. 1.

B represents the basin or reservoir, made preferably circular and concave in shape, as shown, and secured by rivets *a* or other suitable means to the vertical pipes A and A′, which thus form its supporting-standard. This outer pipe A is made preferably cylindrical in shape, with straight smooth exterior walls where coming in contact with the ground and base, so that any action of the frost in heaving these latter will not lift the standard but allow the base D, which may be made of stone, concrete, iron, or other suitable known material, to slide vertically thereupon, as the ground-level, represented at H, is raised or lowered. The inner standard-pipe A′, is adapted to fit over or into the ordinary sewer-pipe I in the usual manner, leaving free access to the interior of said pipe A′ for the warm air from the sewer, and the space between the pipes A and A′ may be packed with non-heat-conducting material, if desired. Near their lower ends said standard-pipes are pierced at any appropriate point, as at *i*, for the admission therethrough of the street service-pipe E, which below the frost-line is fitted with the ordinary stop and waste cock, represented by W, operated by the usual street service-key. The box for this key may be either carried up through the base D, as shown, or placed entirely outside of said structure in the ordinary manner. The said service or supply pipe E is carried upward within said standard-pipe A′, as shown at E′, and its upper end is then carried through a tightly-fitted aperture in the bottom of the basin B, as hereinafter explained, thence turned, first horizontally toward the rim of the basin and thence again horizontally and at an angle to the radius of said basin and there terminated in an open mouth. By this construction the supply-fluid entering the basin under pressure through said supply-pipe is caused to impinge on the interior surface of said basin at an obtuse angle to its immediately continued line of current, thereby causing a circular or gyratory motion in the body of fluid in said basin. It is obvious that for convenience of construction these bends in the supply-pipe may be made by use of the ordinary steam or water pipe fittings, and that to insure a tight fit, where the several pipes pass through the bottom of the basin B, said pipes may be cut a short distance above such bottom, a screw-thread cut on the exterior of said pipes where so cut, a ferrule *e′* screwed below the lower cut end, and, after passing said pipe upward through the bottom of said basin, either a pipe coupling *e* or elbow, as desired, screwed down tightly thereupon, thus securing the bottom wall of the basin B tightly between the upper end of said ferrule and the lower end of said coupling. Washers may also be interposed between these parts in the usual manner, if desired; and into the upper end of said pipe coupling or elbow the upper cut end of said pipe is then screwed.

Near the center of the basin B, but far enough apart for the requisite strength and convenience of working, three holes are made,

and by means similar to those above explained the supply-pipe E′, as already described, the waste-pipe F and the warm-air pipe J are secured, respectively, therein. The waste-pipe F, which is of larger diameter than the supply-pipe E′, is extended below the bottom of the basin B and discharged into the sewer I, and above the bottom of said basin B it is formed into the siphon-pipe G, its upper end being bent over so as to form a vertical half-bend, as plainly shown at Fig. 1. The area of this half-bend is greater than that of the remainder of said siphon-pipe and its uppermost part is located a short distance below the level of the rim or outside overflow of the basin B, and the intake of said siphon is located a short distance below the throat of said half-bend. The upper end of the warm-air pipe J is left open and is located above the level of the top of said siphon waste-pipe G, and its lower end is opened either into the interior of the standard-pipe A′ or into the sewer I, thereby permitting the warm air from the sewer to have free flow into the interior of the cap C, hereinbelow described.

On the interior of the basin B and outside of the apertures through the bottom above mentioned is loosely fitted the cap or cover C, the top of which extends above the level of the top of the air-pipe J and incloses the said siphon-pipe G, the warm-air pipe J, and a part of the upper end of the supply-pipe E′, as shown; but the discharge end of said supply-pipe passes outside of said cover C through an aperture formed therein. Near its bottom edge said cover C is pierced by a hole *c′* for use as a basin-waste. This basin-waste is preferably located behind the supply-pipe in direction contrary to that of the feed, as shown at Fig. 2, so as to permit nearly a complete circuit to all of the feed fluid before encountering such waste-orifice. On the top of the siphon-pipe G may be formed a boss K, into the top of which is tapped a screw-thread for the purpose of receiving the thread of the screw or bolt K′, which is then slipped downward through a suitable hole in the top of the cap C and screwed tightly into said boss K for the purpose of holding said cap C firmly in place, as shown in Fig. 1. In operation the supply-cock W being opened the supply-pipe E′ is filled with fluid under pressure from the water-main or other source of supply, which fluid, issuing with force from the orifice E″, impinges at an obtuse angle to its immediately continued current upon the interior surface of the basin B, and thereby imparts a circling or gyratory motion to the contents of said basin and brings the supply-fluid to the surface at the outside edge of such body of water or other fluid within said basin. This supply causes the body of fluid gradually to increase in depth within the basin B and the cover C through the orifice *c′* until it reaches the level indicated by the dotted line *m m* in Fig. 1 and fills the pipe G. A siphonic action then takes place in said pipe G, and (such pipe being of greater diameter than the supply-pipe E′) the level of the water in said basin B is reduced under siphonic pressure to that of the intake of the pipe G, (which point is indicated by the dotted line *m′ m′* in Fig. 1,) when air being admitted to said pipe G through its intake from the air supply J, said siphonic action is arrested and the level of fluid again raised within the basin B and cover C until said pipe G is again filled and the siphonic action repeated, and so on, as long as the supply is continued.

It is obvious that the rate of exhaust through the waste-pipe G will be affected by the relative weight of fluid in the long and short legs of the pipe forming the siphon, and that, therefore, such exhaust can be regulated either by contracting or shortening such long leg. It is also obvious that in freezing weather water supplied through the earth and pipe E′ will be warmer than the outside atmosphere, and that, as the body of water in the basin becomes chilled, the warmer supply would naturally rise to the surface of the water in the basin and the colder water in the basin settle to the bottom thereof through the force of gravity. When the difference in temperature between the congealing-point of said fluid and the atmosphere to which it is exposed is not great, the warm-air pipe J may be dispensed with and one or more holes *c″*, made through the top of the cover C, as shown in Fig. 1, permitting the free flow of outer air to and from said siphon-pipe G. Attention is called to the fact that when so desired my said apparatus may be attached to the side of a building, and the supply and waste pipes introduced therethrough to a semicircular or other suitably-shaped receptacle for the fluid. In such form of construction the standard would be dispensed with, the supply-pipe opened directly into said receptacle, and the siphonic extension of the waste-pipe covered by a hollow cap, having its side contiguous to the side of said receptacle next to said building and its lower edge at or near the bottom of said receptacle; but the operation of such form of apparatus would be identical with that first above described, and therefore it is not illustrated.

I am aware that supply-nozzles giving a gyratory motion to the contents of watering-troughs have been heretofore employed; but in such cases the waste fluid has been taken from near the surface of the water in the basin, (which, from the nature of all fluids, is warmer than that portion of the fluid which has gravitated to the bottom of the basin,) and consequently by such apparatus the cooler portion of the fluid is not first abstracted from the body of fluid in the receptacle, as is the case in my said improved apparatus.

I am also aware that an inverted cup-shaped cover inclosing the supply and waste pipes in a watering-trough has been heretofore in use; but in such apparatus the sup-

ply and waste orifices were both located within such cover, permitting a direct flow from one to the other within such cover, and not necessarily establishing a circulation in the main fluid-receptacle. Such construction allowed the fluid in the basin outside of said cover to be at rest and easily congeal while yet the circulation of fluid within said cover continued.

These disadvantages I overcome by use of my improved apparatus, as above explained and described.

Having thus described my improvements and manner of operating the same, what I claim as new, and desire to secure by Letters Patent, is—

1. A non-congealing apparatus for fluids, comprising a hollow standard communicating directly with the open sewer and containing the supply, waste and air pipes, a fluid receptacle superimposed thereon, a hollow curb, or cover, located therein or connected therewith, inclosing the waste and air pipes and imperforate where in contact with the upper portion of the body of fluid in said receptacle, a siphon extension to the waste pipe with its intake located within said curb, or cover, and a short distance below the level of the exterior overflow of said receptacle, and a pipe conducting air from the sewer and discharging within said curb, or cover, above the level of the siphon pipe.

2. A non-congealing apparatus for fluids, comprising a hollow standard communicating directly with the open sewer and containing the supply and waste pipes, a fluid receptacle superimposed thereon, a hollow curb, or cover, located therein or connected therewith inclosing the intake to the waste pipe and imperforate where in contact with the upper portion of the body of fluid in said receptacle, a siphon extension to the waste pipe with its intake located within said curb or cover, and a short distance below the level of the exterior overflow of said receptacle, an air intake to said curb or cover, opening above the level of said siphon pipe, and a fluid-supply orifice discharging tangentially into said receptacle outside of said curb or cover.

3. A non-congealing apparatus for fluids, comprising a fluid receptacle having a curb, or cover, located therein or connected therewith, which is imperforate where in contact with the upper portion of the body of fluid in said receptacle, a waste pipe having its intake located within said curb or cover, a supply pipe discharging into said receptacle outside of said curb or cover, and a pipe conducting air from the sewer and discharging within said curb or cover.

4. A non-congealing apparatus for fluids, comprising a fluid receptacle having a curb or cover located therein, or connected therewith, which is imperforate where in contact with the upper portion of the body of fluid in said receptacle, a waste pipe having its intake located within said curb or cover, and a supply pipe discharging into said receptacle outside of said curb or cover.

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Witnesses:
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