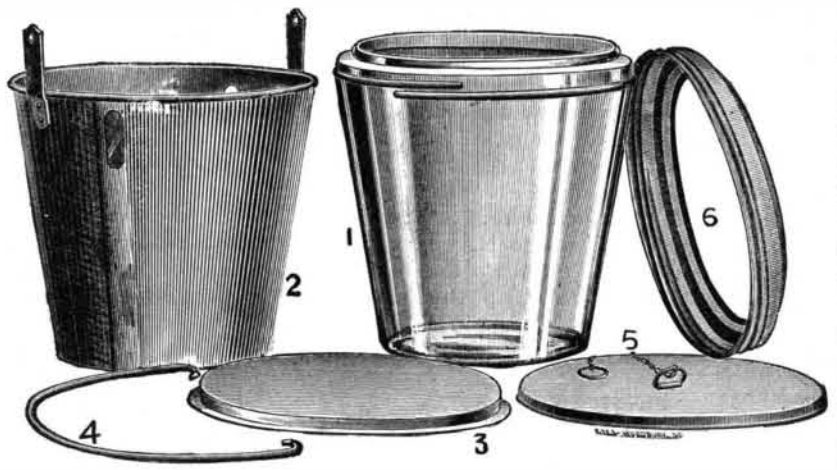
THE WORCESTER CHEMICAL FIRE PAIL.

The fire pail shown in the accompanying illustration forms the subject of several patents which have been taken out in the United States and foreign countries, and has received the strong indorsement of leading insurance men, and of prominent manufacturers and mill owners who have given it a trial. The pail proper is made of glass, consequently it cannot rust out, soak out, or dry up and fall to pieces, as so frequently happens with other pails. It has a threaded top as shown in Fig. 1. The glass interior is inclosed in a corrugated tin jacket, Fig. 2, which protects the glass and has openings in its sides at the top so that the liquid contents may be readily inspected. After being filled with a chemical fire-extinguishing liquid, the glass pail is hermetically sealed with a soft tin foil cover, Fig. 3, which is secured in place by having screwed over it a rim, shown in Fig. 6. The bail, shown in Fig. 4, is so made as to hold the pail and tin jacket together; and the tin cover, which fits over the tin foil top, is connected by a small chain with an eye on the hook by which the pail is ordinarily suspended ready for use, as shown in one of the views, so that when the pail is quickly taken for use, in any emergency, the cover will be automatically removed. The tin foil cover is then readily broken with a slight thrust of the hand, and the liquid, which has been kept from evaporation, is ready for use. This chemical liquid is said to contain no acid, will not freeze, and will not harm the hands or clothing, and will not lose its strength by being kept for a long period. Coming in contact with flame, it is designed to evolve 1,500 times its volume of fire-extinguishing vapor, and also form a fireproof coating, making it impossible for the fire to continue where it strikes.

Further information relative to these handy fire buckets may be obtained of the manufacturers, the Worcester Fire Appliance Company, Worcester, Mass.

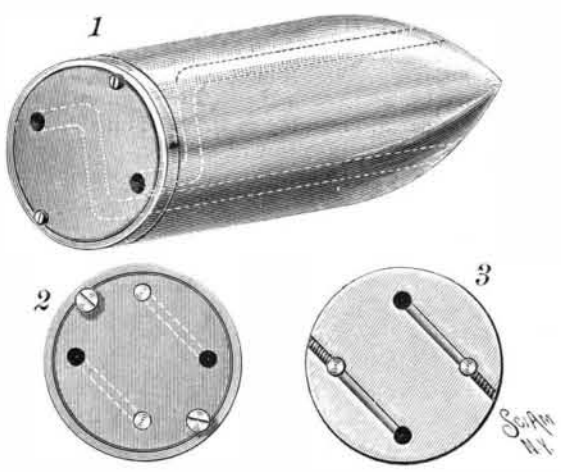
THE WORCESTER CHEMICAL FIRE PAIL COMPLETE.



DIFFERENT PARTS OF THE WORCESTER CHEMICAL FIRE PAIL.

A PROJECTILE ROTATED BY THE EXPLOSIVE.

In the projectile shown in the illustration, which has been patented by Mr. William Bowman, of Atchison, Kansas, it is designed that a portion of the gases generated by the explosion shall pass through transverse and horizontal passages of the projectile, and, bearing upon the walls of the passages, act to turn the projectile, on the principle of the Barker mill. Fig. 1 is a perspective view, showing in dotted lines the passages through the projectile, Fig. 2 representing the butt end of the projectile, in the edges of which is the usual gas check, held in place by set screws. Two or more bores are made from the forward end of the projectile to a point not far removed from its base, where they are intersected by smaller transverse bores, tangential to an imaginary circle concentric with the peripheral face of the projectile, the other end of the smaller bores opening into bores extending forward from the butt of the projectile. The transverse bores may be made, as shown in the cross sectional view, Fig. 3, by boring in from the outside of the projectile, and afterward inserting plugs to close the exit of the gases except through the longitudinal passages, or such transverse bores may be made diagonally from openings in the base, thus avoiding the use of plugs. The necessity of rifling or grooving gun barrels is designed to be obviated by the use of this projectile, to which the necessary rotary motion may be given by the force of the gases of explosion acting on the walls of the passages.



BOWMAN'S PROJECTILE.

The Preservation of Timber.

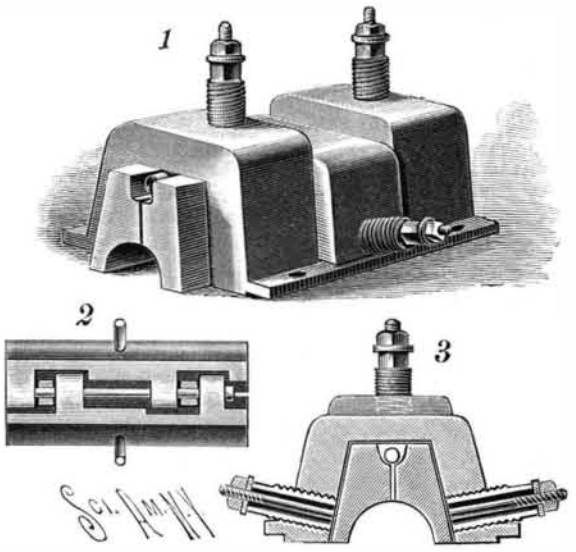
The chief processes that have been employed for the preservation of timber are, says *Engineering*, kyanizing, burnettizing, and creosoting, that is, impregnation with bichloride of mercury, with sulphate of zinc, and with creosote. Many others have been proposed and tried, but only these three have survived. The first seems to be well adapted for bridges, or for timber exposed to weather alone, and not to constant moisture. Examples have been found in America which were in a good state of preservation after twenty-eight years' exposure. But when kyanized timber has been used for railway sleepers and pavements it has had only a doubtful success, probably in consequence of the washing out of the corrosive sublimate. The wood is allowed to steep one day for each inch in thickness of its least dimension, and one or two days in addition. The solution contains 1 per cent by weight of corrosive sublimate, and from 4 lb. to 5 lb. of this are absorbed per 1,000 ft. b. m. Burnettizing may be performed in the same way, sulphate of zinc being the chemical employed, but it is usual to steam the timber first to open the pores, and then to subject it to a vacuum to withdraw the sap. If this be not done, the timber must be stored for a considerable time to allow it to dry naturally. When treated the wood should not be placed in exposed situations, such as bridges, or else the zinc will be washed out and leave it unprotected. This is particularly true when weak solutions are used, and when the potency is greatly increased the tenacity of the timber is impaired. In Germany 1·91 per cent is considered the proper strength for railway sleepers. Several suggestions have been made to confine the zinc in the timber; Mr. W. Thelmany proposed to subject the timber to a subsequent bath of chloride of barium, with the view of producing an insoluble sulphate of baryta. It is doubtful, however, if the reaction would go on in the minute sap ducts of the wood. Another process is that of Mr. Wellhouse, who also employs a double solution, the first being chloride of zinc to which a little glue is added, and the second a solution of tannin. It is claimed that the latter upon coming in contact with the glue forms small particles or films of artificial leather which plug up the mouth of the sap ducts and prevent the zinc being washed out. Certain experiments which have been made seem to confirm the idea. Another plan consists in using a solution of chloride of zinc and gypsum. The gypsum crystallizes and hardens inside the sap ducts, and forms partitions to hold the zinc within the cells. There are three burnettizing works in the States, and the cost of the process is about $5 per 1,000 ft., board measure, or 20 cents to 25 cents a sleeper.

Creosoting is so well understood that it scarcely needs description. It is in almost universal use for sleepers for English railways, and no other process has been commercially proved capable of resisting the *Teredo navalis* and *Limnoria tenebrans*. Here and in Holland 10 lb. to 12 lb. of creosote oil per cubic foot of timber are found sufficient for harbor purposes; the French use 19 lb. for the same purpose, and a similar quantity has been found necessary in the Gulf of Mexico, where the marine worms cut off an unprepared pile in eight months. The creosoting process needs to be well done to be effective, and for ordinary purposes 8 lb. to 12 lb. are required per cubic foot of timber.

It was generally considered that the presence of heavy oils in the creosote was objectionable, and therefore engineers were accustomed to specify that not more than 10 per cent should be present. This view has been controverted by others, who take the view that it is only the heavy oil which can be relied upon to exert a continuous preservative action, the creosote itself being liable to become dissipated in course of time. This view receives confirmation by the good results of the preservative process introduced by Mr. Henry Aitken, of Falkirk. This consists simply in soaking timber in melted naphthaline for a period varying from two to twelve hours, depending on the bulk of the piece. A temperature of 180° to 200° Fahr. is all that is required for the process, and is most easily obtained by placing steam pipes in the bottom of the tank which contains the material. Simple as the process is, that is not its chief merit. A more valuable feature is that it can be applied to green timber, thus doing away with the long and expensive process of seasoning. The naphthaline makes its way through the pores of the wood, decomposing the albuminoid compounds, and displacing both sap and water. It then becomes fixed, and the whole substance is permeated with solid antiseptic of a permanent character.

A JOURNAL CAP FOR WOOD-WORKING MACHINES.

The illustration represents a journal cap more especially designed for use on bearings of spindles which carry matcher heads on planers, and also adapted for other machines, being capable of ready and accurate adjustment to take up wear. It is a patented invention of Mr. Willard A. Shank, Amoskeag, Ga. On the inside of the casing is a longitudinal recess in which are held two bearing plates or boxes, as shown in the perspective view, Fig. 1, and the sectional view, Fig. 3, these plates together forming a semicircular recess to engage the top of the spindle. The plates are connected with each other on top by a hinge, as shown in Fig. 2, the pintle of the hinge being passed through eyes in the lower ends of screw bolts which extend upward through hollow screws screwing in the top of the casing. Nuts on the outer threaded ends of the bolts screw against washers on the outer ends of the hollow screws, and by screwing the latter up or down in the casing the pintle of the hinge is raised or lowered to move the bearing plates up or down in the recess. An arm extends outwardly from the side of each bearing plate through a hollow screw adapted to abut against the plate, a nut screwing on the outer end of the arm against a washer bearing on the hollow screw, whereby the bearing may be firmly held in place by screwing up the nut. When the cap is first used, the bearing plates are left slightly apart, as shown in Fig. 1, the screws being afterward adjusted to move the plates downward and inward when their inner recessed surfaces have become slightly worn, whereby all slack or wear is taken up.



SHANK'S JOURNAL CAP.

Phenomena by Means of the Electric Discharge.

In a recent communication to the Academie des Sciences, M. Ch. V. Zenger states that observations of the effects produced by the Wimshurst machine on smoked glass plates led him to experiment with a view of obtaining an electrically produced imitation of various well known solar phenomena. A large sheet of glass well dried on one face and covered with lampblack on the other was placed between the terminals of a Wimshurst machine. The + pole was brought very close to the blackened surface, in the center of which there was a circular tin disk. The — pole was from 10 to 20 cm. distant from the other side. Sparkless discharges disturbed the blackened surface, and a representation of the lines of electric force was drawn upon the glass. The result was a striking reproduction of a total eclipse of the sun, the metallic disk representing the moon. The lines of force produce around the edge of this disk all the chromospheric phenomena witnessed during a solar eclipse, such as eruptive, linguiform and auroral protuberances. If the experiment is carried out in a dark room, red flames may be seen coming from the edge of the disk, which exactly resemble in form and color those visible during a solar eclipse. Blackened glass balls submitted to the Wimshurst discharge exhibit white spots, the photographic negatives of which are precisely similar to those of sun spots.