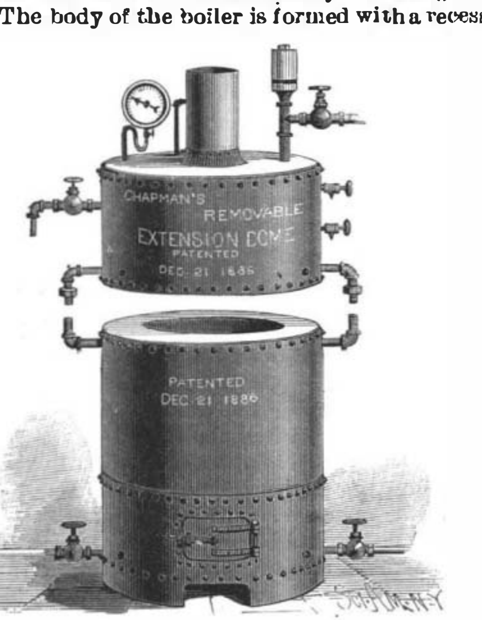
IMPROVED STEAM BOILER.

The upper ends of the flues of vertical boilers, as commonly constructed, are exposed to hot steam upon one side and the heat of the fire upon the other, and the flue sheet is similarly subjected to the action of steam and fire. The result is that the flues become leaky, and are eventually destroyed. In the boiler here illustrated, and which is the invention of Mr. Wm. J. Chapman, of 97 Forest Street, Rutland, Vt., the upper ends and the flues are continuously submerged in water. The body of the boiler is formed with a recessed



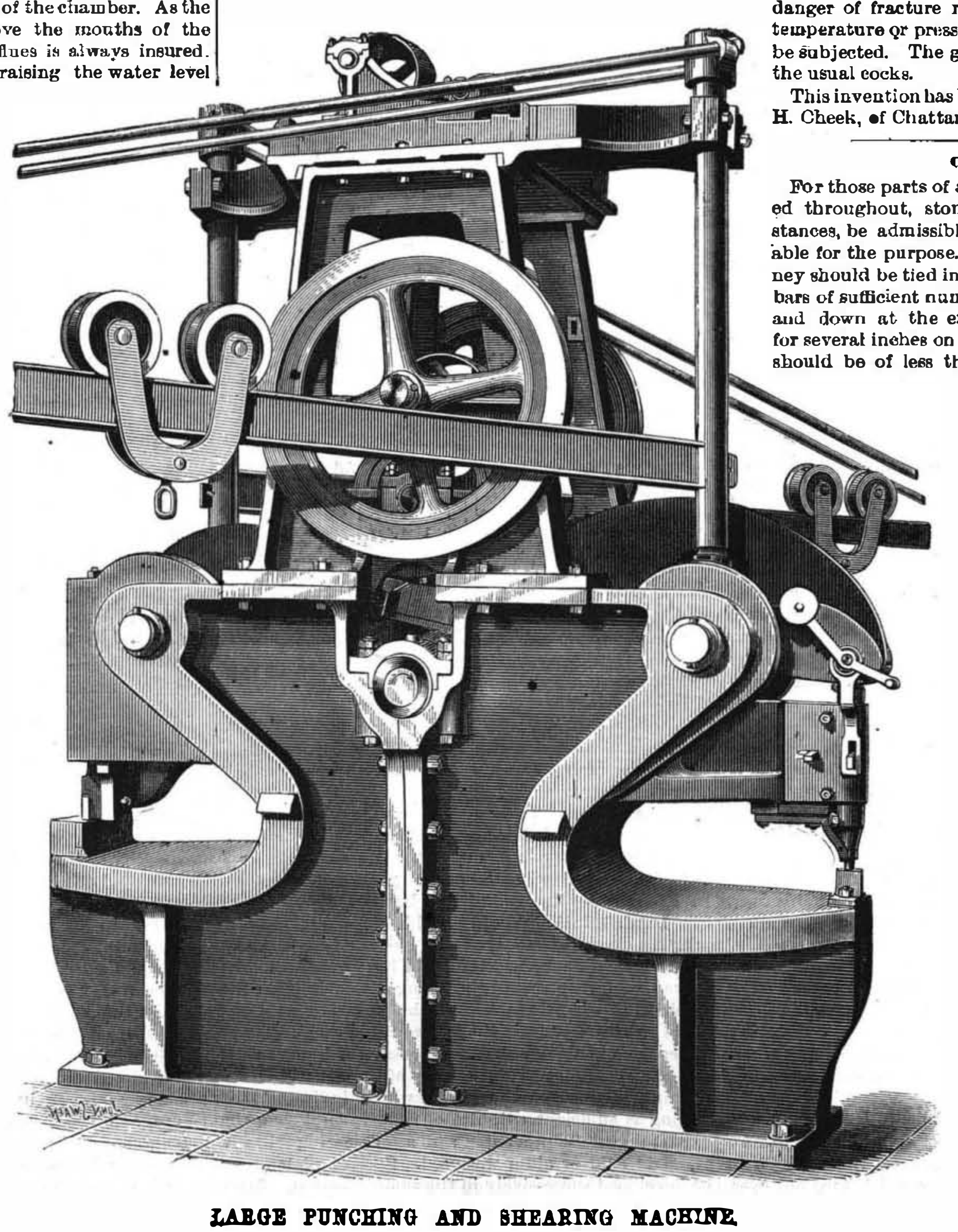
CHAPMAN'S IMPROVED STEAM BOILER.

head, surrounding which is an annular space provided with outlet pipes. Resting upon the head is a chamber of the same diameter as the boiler, and within which is a hollow cone. The internal diameter of the base of the cone is the same as that of the recessed head, and the cone and head together form a smoke chamber, in which are received the products of combustion passing through the flues. In the side of the chamber, near the bottom, are inserted tubes that connect with the tubes in the body of the boiler. These tubes establish communication between the upper part of the body and the lower part of the chamber. As the water level is maintained above the mouths of the tubes, the submerging of the flues is always insured. The chamber, in addition to raising the water level so that the flues are protected, provides efficient steam room, increases the heating surface, and utilizes the heat of the flues, which would otherwise pass directly to the smoke pipe and be lost. Whenever necessary, the chamber can be readily removed.

LARGE PUNCHING AND SHEARING MACHINE.

Owing to the great breadth, as well as length, of steel plates which shipbuilders can now procure, and which it has been found most advantageous in many ways to adopt—particularly in the plating of large vessels—a necessity has arisen for punching and shearing machines with gaps of a depth not hitherto thought of. The machine which we now illustrate has to punch and shear 1⅛ in. steel plates, but the power required to do that is not the only element which renders necessary so large and heavy a machine. The depth of the gap, more than anything else, regulates the size and weight of such a tool; and as the gaps on the above machine are 42 in. deep, admitting of punching holes in the center of a plate 7 ft. wide, some idea may be formed of the proportions of the machine. Messrs. James Bennie & Co., says *The Engineer*, have just completed two of these for Messrs. Harland & Wolff's extensive ship yard at Belfast, and one of them has been at work for some weeks past. One peculiar feature in the arrangement is the design adopted for the cranes. In a machine of this kind, of course cranes are requisite with jibs having range enough to deal with plates up to 27 ft. length, and strong enough to carry upward of two tons at the point of the jib safely. But hitherto, with the "cam and lever" type of machine, now so greatly preferred by ship platers, it has been difficult to get cranes with freedom to swing in all positions without coming in the way of the driving belt. This difficulty has been overcome in the machine under notice by carrying the strap over guide pulleys on a framing up over the ordinary driving pulleys, and at such height as clears the cranes altogether. The latter are thus free to slew in all directions, without being interfered with by the driving belt.

The design will be readily understood from the illustration, although, to save space, the cranes are shown with the jibs cut off short. It is well known that, for obvious reasons, it is a bad practice to carry the upper end of a crane post up to the roof of the building for support there. By the above arrangement the framing carrying the guide pulleys is made to form a substantial support for the top end of the crane post, and thus the machine becomes self-contained, and might be placed in any outside shed or building.



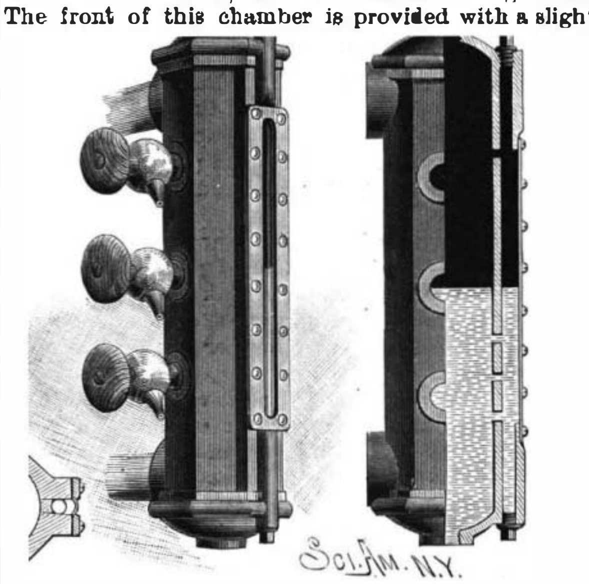
LARGE PUNCHING AND SHEARING MACHINE.

Alloys.

In a recent lecture, Professor Austen Roberts mentioned that the union of copper and antimony by fusion produces a violet alloy when the proportions are so arranged that there is 51 per cent of copper and 49 per cent of antimony in the mixture. This alloy was well known to the early chemists, but, unfortunately, it is brittle and difficult to work, so that its beautiful color can hardly be utilized in art. The addition of a small quantity of tin to copper hardens it, and converts it, from a physical and mechanical point of view, into a different metal. The addition of zinc and a certain amount of lead to tin and copper confers upon the metal copper the property of receiving, when exposed to the atmosphere, varying shades of deep velvety brown, characteristic of the bronze which has from remote antiquity been used for artistic purposes.

WATER GAUGE FOR STEAM BOILERS.

The body of the gauge consists of a hollow metallic shell closed at the ends, and made with side openings near the top and bottom, and having projecting flanges that form connections with the steam and water space of the boiler. A narrow chamber is formed in the gauge by a partition that is perforated near its top and bottom, to permit the entrance of steam and water, and equalize the pressure which preserves the equilibrium of the water, and also checks its agitation. The front of this chamber is provided with a slight



CHEEK'S WATER GAUGE FOR STEAM BOILERS.

opening, covered with a plate of mica, through which the height of the water can be seen. The mica is held in place by a flat metallic frame, secured to the body of the gauge by screws, and is swelled outwardly so as to present a convex surface, as shown in the cross sectional view, so that the water may be seen by the attendant when in a position at an angle to the gauge. Openings in the opposite ends of the chamber are closed by screw plugs, which can be removed when it is necessary to clear the chamber or clean the mica. The advantages attending the use of mica in this situation are manifest as compared with glass, there being no danger of fracture resulting from fluctuations of temperature or pressure to which the gauge may be subjected. The gauge may be provided with the usual cocks.

This invention has been patented by Mr. Thomas H. Cheek, of Chattanooga, Tenn.

Chimneys.

For those parts of a chimney which are supported throughout, stone may, under some circumstances, be admissible, but brick is always preferable for the purpose. The abutments of a chimney should be tied into the walls by wrought iron bars of sufficient number and strength, turned up and down at the ends, and built into the jambs for several inches on each side. No part of a flue should be of less thickness than half a brick, or 4½ inches. Where slabs of stone or slate are placed level with a floor before the opening of a chimney, they should invariably be laid in sound mortar, cement, or other incombustible and non-conducting substance, and it should be at a distance of not less than 4½ inches from the joists, flooring, or any other woodwork. A chimney built only up to the roof and stopping at that point is always dangerous. Every chimney in a house should be perfectly distinct and separate from every other chimney, from the hearth to the external opening. Chimneys may safely be built in stacks, but they should on no account have any connection within the stacks. Brickwork around flues should not be less than 4½ inches thick in any part. By the Code Napoleon it was not permitted to build a chimney against the wall of an adjoining house without isolating it by an intermediate wall of sufficient thickness to prevent heat passing to the neighboring premises.—*The Architect.*