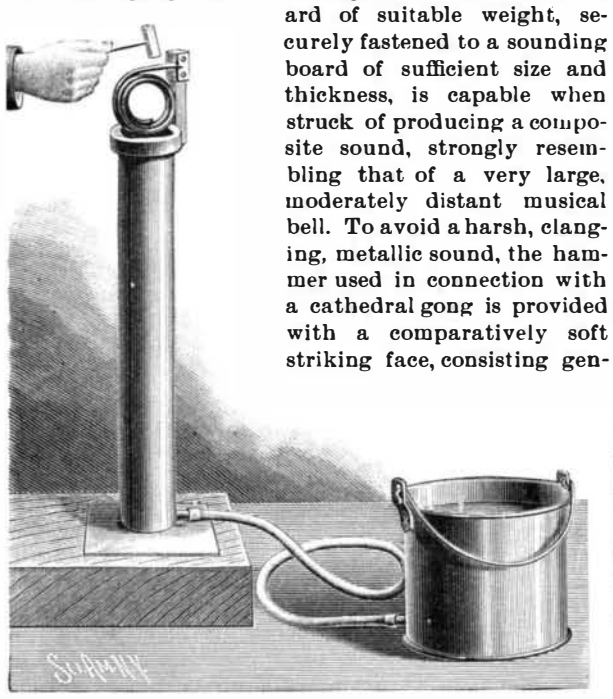
AN EXPERIMENT IN RESONANCE.

BY GEO. M. HOPKINS.

Nearly every one must have heard the cathedral clock gong. Some time since it was applied only to fine French and English clocks, but at present it is largely used in the better class of American clocks. There is, however, a great difference in these gongs and in the way in which they are mounted, and a corresponding difference in the sounds they emit when struck. A gong of uniform temper attached to a standard of suitable weight, securely fastened to a sounding board of sufficient size and thickness, is capable when struck of producing a composite sound, strongly resembling that of a very large, moderately distant musical bell. To avoid a harsh, clanging, metallic sound, the hammer used in connection with a cathedral gong is provided with a comparatively soft striking face, consisting generally of a firm piece of sole leather. If one listens intently to the sound of one of these gongs, he will be able with little difficulty to detect a few of the many tones which form the very complex sound. He can readily distinguish a very grave, subdued note, also a sound of high pitch, and a discord, but no approximation to the number of sounds produced by the gong can be made without a resonator which will select out the different sounds in succession. An instrument of this kind is shown in the annexed engraving. It consists of an upright tube closed at the bottom, open at the top, and furnished with a small lateral tube at the bottom for receiving a flexible tube for conveying water. In the present case the flexible tube is connected with an ordinary tin pail having a lateral tube at the bottom. The upright tube is elevated above the level of the table so that its full length may be utilized as a resonator. The cathedral gong used in this experiment was a small one formed of a rod of steel one-eighth inch wide, one-sixteenth inch thick, and about thirty inches in length, formed in a spiral of about three turns, the outer end being secured to an arm projecting upward from a heavy metal cap resting on the top of the resonator. The hole in the cap is somewhat smaller than the mouth of the resonator.



EXPERIMENT WITH THE CATHEDRAL CLOCK GONG AND RESONATOR.

The gong being struck at a point near its fixed end by a small soft rubber mallet, is set in vibration. As the striking is repeated at frequent intervals, the pail containing the water is raised, causing the water to flow quietly into the resonator, gradually diminishing the length of the column of air contained by the tube. When the length of the air column is such as to respond to any particular note, that note is re-enforced so as to become prominent. In this manner one note after another is brought out until the last and highest is heard.

By lowering the pail and allowing the water to return to it from the resonator, the re-enforced sounds will be heard in reversed order. As many as eight tones will be heard prominently, while with more care still others will be heard, thus showing the complex character of the sound produced by the gong, and showing clearly the reason of the harmonious and pleasing effect which has made them so popular.

By skillfully using the mouth as a resonator, most of the tones may be separated out so as to be readily distinguished by the operator.

Employer's Liability—Safe Machinery.

The measure of an employer's liability in the matter of providing machinery for his employes was defined as follows by the Supreme Court of Pennsylvania in the recent case of the Lehigh & Wilkesbarre Coal Company *vs.* Hayes: "An employer is not bound to furnish for his workmen the safest machinery, nor to provide the best methods for its operation, in order to save himself from responsibility for accidents resulting from its use. If the machinery be of an ordinary character, and such as can with reasonable care be used without danger to the employe, it is all that can be required from the employer; this is the limit of his responsibility and the sum total of his duty."

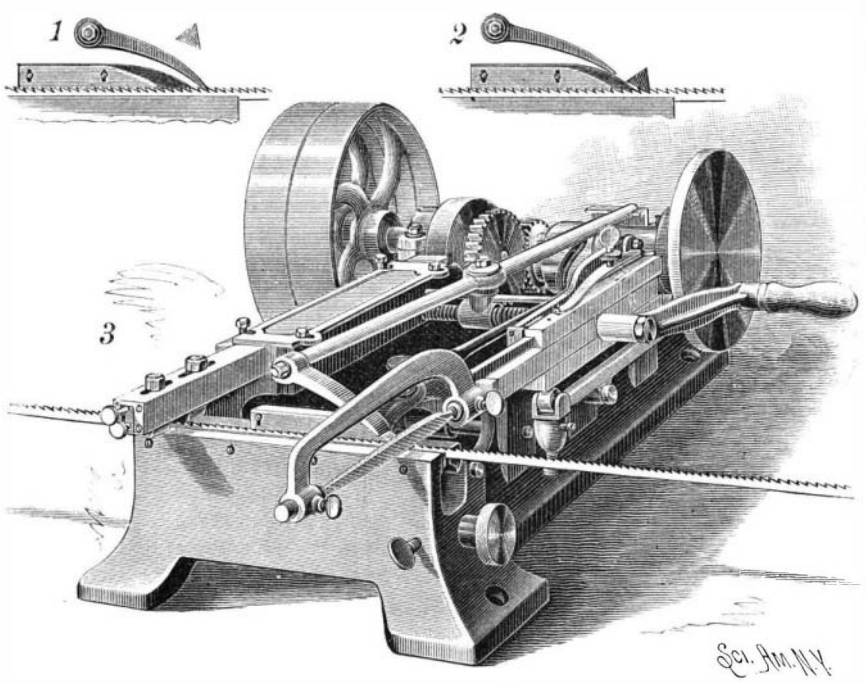
A MACHINE TO SET AND FILE SAWS.

In the machine herewith illustrated the saw is alternately clamped and released, and moved the distance of one tooth during the reciprocation of the file by means of a holder sliding in a guideway, the teeth being at the same time automatically set by an adjustable mechanism, whereby the work is effected with unfailing accuracy, and the teeth appear uniform when filed. It is a patented invention of Mr. W. H. Parry, New York City.

On the power shaft in one end of the frame of the machine is a crank disk which operates a slide moving in a longitudinal guideway, a file holder on the outer end of the slide having adjustable bushings by means of which different sized files may be readily supported therein. The guideway is pivoted at its inner end on the main frame, while its outer end is supported upon a friction roller adjustable upon a lever, there being on the rear end of the lever a friction roller engaging a cam, whereby, when the slide moves outward, the file remains in a horizontal position, but on its return stroke the file is raised from the saw. A spring whose tension can be readily regulated holds the outer end of the guideway in contact with the friction roller.

The saw is held on a transversely extending bar held between the fixed and movable jaws of a clamping device, the transverse bar being connected with vertically arranged racks whereby it may be adjusted according to the width of the saw blade. The fixed jaw of the clamp is formed on the main frame, and the movable jaw is made in the form of a lever fulcrumed on the main frame. The movable jaw has a tail piece carrying a spring whose free end rests on a cam fulcrumed on a pin on the main frame, and the cam has an arm carrying a friction roller engaging a cam on the main driving shaft, whereby a releasing and clamping movement is given to the movable jaw. On the top of this jaw is held a block whose front face is in line with the face of the jaw, and carrying a guide bar adapted to engage the top of the teeth of the blade, holding the latter in place as it is fed along. Over the rounded front edge of this block the feed pawl is adapted to travel in feeding the saw forward to bring new teeth successively in line with the reciprocating file. The feed pawl is pivoted on the outer end of a feed lever whose other end has a pin engaging a cam on the main driving shaft, each revolution thereof moving the pawl backward and forward, while the feeding forward of the blade is regulated by means of a stud on which the pawl lever is mounted. Fig. 1 represents the position of the pawl as the blade is being fed forward, while Fig. 2 shows its position during the forward stroke of the file.

The saw-setting mechanism has a longitudinally extending bar operated from the main shaft to make a forward and backward stroke to two full strokes of the file. In the front of the bar is a vertical slot in which slide dies for setting alternate teeth to the right and left on the saw blade, the dies being adjustably held by set screws, and readily movable to the position necessary to set the teeth of the saw blade more or less to the right and left. The handle seen at one side will be used, ordinarily, only during the adjustment of the saw in the machine for the starting of the work.

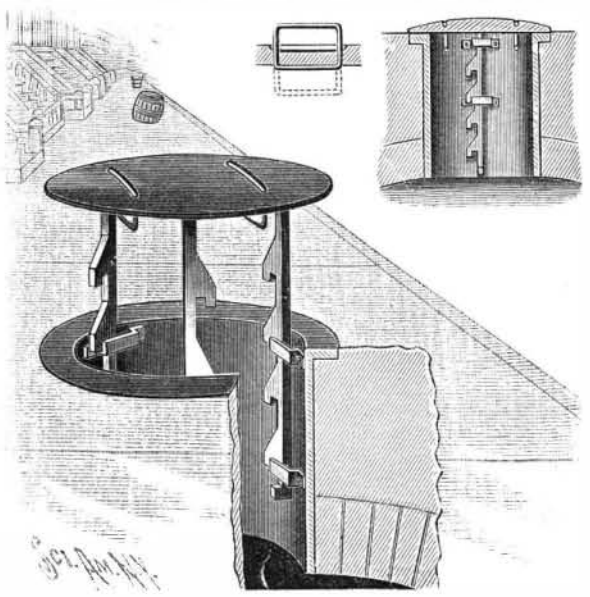


PARRY'S SAW FILING AND SETTING MACHINE.

For further information relative to this machine, address Mr. G. H. Havens, Fifty-sixth Street and Eleventh Avenue, New York City.

A VAULT COVER FOR SIDEWALK OPENINGS.

The illustration represents a device designed to afford for vault openings a cover which may be conveniently lifted and held in elevated position, for purposes of ventilation and the introduction of coal or other material into the vault below, without entirely removing the cover from the opening it is designed to close. It has been patented by Mr. Henry W. Sauer, of No. 207 Tenth Avenue, New York City. The lining thimble or shell inserted in the vault hole, and permanently fixed in its arched roof, has secured in its sides vertically arranged keepers or rectangular loops, adapted to engage toes integral with downwardly projecting limbs on the under side of the cover. The handles are made of rectangular links, loosely secured to slide in perforations in the cover, which, in use, may be raised to the height desired and then held in such position by a slight lateral turn, whereby the toes on the limbs may be placed in engagement with the keepers. A reverse movement of the cover will permit it to be lowered upon its seat in the top of the vault opening.



SAUER'S VAULT COVER.

Horned Dinosaurs.

At the late meeting of the British Association, in the Geological Section, Prof. Marsh gave an interesting account of his discoveries with regard to the gigantic Ceratopsidæ, or horned Dinosaurs. During the last two years Prof. Marsh has been working in the far West of America, near the Rocky Mountains, at certain beds called Laramie. It was formerly doubted as to whether these beds were tertiary or cretaceous, and it has now been found, by examination of the flora, that the lower part is true cretaceous and that the upper part is tertiary. In the true cretaceous these saurian remains have been discovered. They are of great size, and the blocks in which they are embedded sometimes weigh as much as two tons. Securing them has been a work of great difficulty, and has called for the exercise of much engineering skill. The remains, of which the professor exhibited diagrams, particularly of the skull, differ from those most familiar to European workers. The skull is of great size, and is characterized by two large horn cores near the eyes, and by one smaller horn core on the nose, like the rhinoceros, the latter extending a considerable way backward, where it appears to be armed by rudimentary cores. The teeth also are peculiar in having two fangs implanted crosswise. In the adult, the length of the skull is quite eight feet. The brain is relatively very small. To bear this enormous weight there are peculiar modifications of the neck vertebræ and of the four limbs. Prof. Marsh is disposed to refer this Ceratopsida to a distinct order of the Dinosaurs.

A Paste which will Stick Anything.

A paste which will stick anything is said by Professor Winchell to be made as follows: Take two ounces of clear gum arabic, one and a half ounces of fine starch, and half an ounce of white sugar. Dissolve the gum arabic in as much water as the laundress would use for the quantity of starch indicated. Mix the starch and sugar with the mucilage. Then cook the mixture in a vessel suspended in boiling water until the starch becomes clear. The cement should be as thick as tar, and kept so. It can be kept from spoiling by the addition of camphor or a little oil of cloves.

To cure a felon, says a correspondent, mix equal parts of strong ammonia and water, and hold your finger in it for fifteen minutes. After that withdraw it and tie a piece of cloth completely saturated with the mixture around the felon and keep it there till dry.