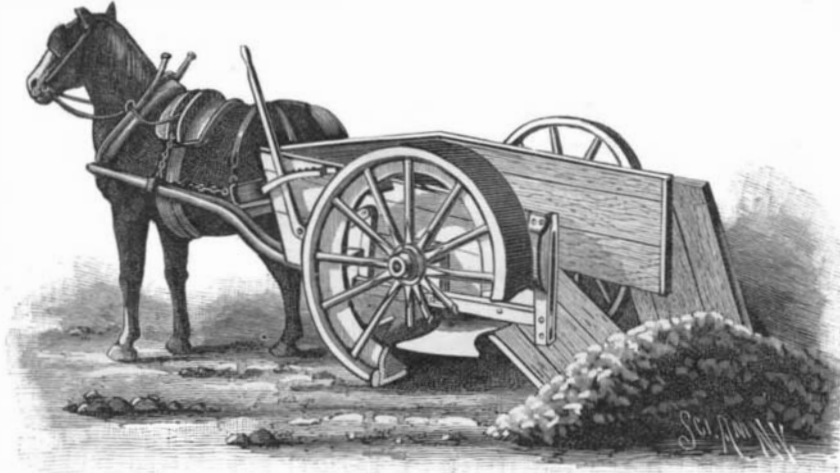


**GRADING AND DITCHING MACHINE.**

The cart is provided with a tilting bottom, and is carried upon one plain wheel and upon one wheel formed with buckets upon the inner side at the rim. On the side of the rear of the cart next to the bucket wheel is secured a knife, which serves to remove any dirt that may extend beyond the inner side of the bucket wheel. A plow for filling the buckets is attached to a beam provided with a lever mechanism, by means of which it may be raised and lowered as desired. As the cart is drawn forward, the earth is thrown by the plow into the lowest buckets; as the wheel revolves, the buckets dump the earth upon an inclined board, resting upon the top of the side of the cart, and down which it slides to the inside. When full, the cart can be taken to any convenient place and its load dumped.



**TOBIAS' GRADING AND DITCHING MACHINE.**

This invention has been patented by Mr. Benjamin Tobias, of Washington, Ill.

**IMPROVED FIRE ESCAPE.**

The prevalence of destructive and fatal fires in the larger cities during the past few years has called forth a strong effort on the part of our inventors to devise efficient means for the rescue of those imprisoned in burning buildings. We have illustrated several of these devices from time to time, and in our present issue show one which has recently been patented by Mr. Thomas Macdonough, of Cheboygan, Mich.

It is the merit of the invention that it scarcely needs explanation, since our illustration tells the whole story at a glance. A strong metallic cable is stretched along the front of the building just below the cornice. Movable rings support vertical cables, which are connected in pairs by means of iron cross bars. These bars are provided with two friction wheels at each end between which the cables pass. A strong hook on the cross bars permits the suspension of a metallic basket, which,



**MACDONOUGH'S IMPROVED FIRE ESCAPE.**

when in use, is brought to the level of the window sill, so that a person can readily step into it. The device is manipulated by two persons on the street, who raise the frame and basket by separating the lower ends of the cables, and allow them to descend by approaching each other. The speed of the descent is thus regulated at pleasure, and the rescued persons may be landed on the opposite side of the street, away from the burning

building. The baskets are made telescopic, so as to occupy but little space when not in use, and are kept in the different rooms of the building.

Practical tests of this escape have been made in Detroit and other places in the West, and its action pronounced very satisfactory. Being entirely metallic, it is fireproof, and may be kept in service as long as the strength of the building will permit.

**Percentage.**

The reckoning of percentages, like the minus sign in algebra, is a constant stumbling block to the novice. Even experienced newspaper writers often become muddled when they attempt to speak of it. The ascending scale is easy enough. Five added to twenty is a gain of 25 per cent; given any sum of figures, the doubling of it is an addition of 100 per cent. But the moment the change is a decreasing calculation, the inexperienced mathematician betrays himself, and even the expert is apt to stumble or go astray. An advance from twenty to twenty-five is an increase of 25 per cent; but the reverse of this, that is, a decline from twenty-five to twenty, is a decrease of only 20 per cent.

There are many persons, otherwise intelligent, who cannot see why the reduction of one hundred to fifty is not a decrease of 100 per cent, if an advance from fifty to one hundred is an increase of 100 per cent. The other day an article of merchandise which had been purchased at 10 cents a pound was resold at thirty cents a pound, a profit of 200 per cent; whereupon a writer, in chronicling the sale, said that, at the beginning of the recent depression, several invoices of the same class of goods which had cost over thirty cents per pound had been finally sold at ten cents per pound, a loss of over 200 per cent. Of course, there cannot be a decrease or loss of more than 100 per cent, because this wipes out the whole of the investment. An advance of from ten to thirty is a gain of 200 per cent; a decline from thirty to ten is a loss of only 66 2/3 per cent.—*Jour. of Commerce.*

**IMPROVED METAL TONGS.**

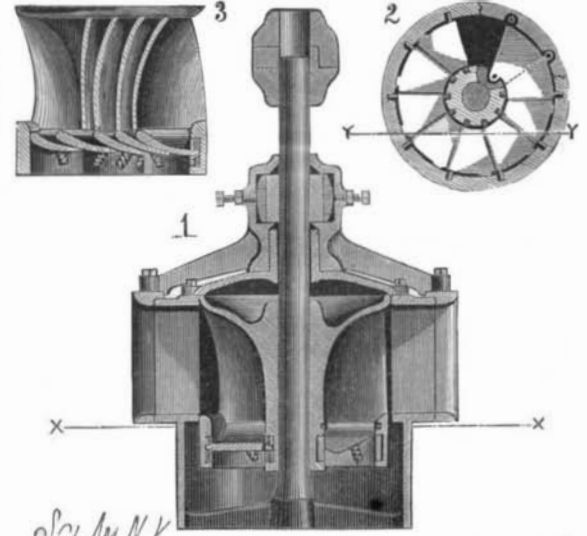
These tongs are designed to enable the blacksmith to do the most difficult jobs of welding without the use of helpers. Fig. 1 is a perspective view of the tongs, with two sections of pipe clamped in them ready to make the miter weld shown in Fig. 5; Fig. 3 shows a miter weld of two pieces of one-half inch square bar; Fig. 2 shows a section of gas pipe butt welded; and Fig. 4 represents a taper tap that was broken in the center, and which the inventor of these tongs, Mr. William W. Winegar, of Chambersburg, Ill., brazed together, making the tap as good as it was before being broken.

To the forward end of each of the arms is secured, by means of a set screw, a clamp, in the upper jaw of which is a screw; these clamps are provided with long necks, into which the ends of the arms fit. This construction allows the clamps to be pushed up or down on the arms, to lengthen or shorten them as required, and by means of the screws the clamps may be held at any desired angle. The arms are held at any distance apart by a curved bar attached to one arm and passing through a slot in the other. When the tongs are in use, the pieces to be joined are placed in the clamps and held by turning down the screws, the clamps having been first adjusted on the arms to suit the shape of the pieces. After the pieces have been properly set in the clamps, the arms are brought together, and held firmly by turning the screw down on the curved bar. The pieces are then in position for soldering, welding, or brazing. It will be seen that the operator has complete control over his work, and gains much time in bringing the two parts together. In joining the pieces, instead of striking their ends, the clamps may be struck on projecting side pieces, thereby preventing damage to the ends of the parts. The device is exceedingly simple, is durable and efficient in use, and can be made at a small cost.

MR. C. H. CHASE, of Bridgewater, N. S., writes to us that, contrary to the generally accepted belief, the first gold found by James Marshall in California was not on the Sacramento River, but on one of its tributaries, the Feather, about 45 miles above the city of Sacramento, and within the limits of the present city of Marysville.

**GATE FOR WATERWHEELS.**

The invention herewith illustrated—patented by Mr. D. L. Trullinger, of Union Mills, Oregon—consists of a waterwheel having a series of hinged discharge gates, so constructed and arranged that springs regulate their opening or closing, according to the pressure and the amount of water supplied. Fig. 1 is a vertical sectional elevation of a waterwheel, showing the gates partly open; Fig. 2 is a plan view on line *xx*, and Fig. 3 a vertical section on line *yy*, showing the gates closed. The waterwheel, of any approved construction, is inclosed in a casing provided with the usual chutes. Directly under each bucket is hung a gate



**TRULLINGER'S GATE FOR WATERWHEELS.**

formed with trunnions placed in bearings in the rim and hub of the wheel. The gates are arranged radially and form bottoms for the buckets, and each is curved downwardly and overlapped by the one next following. On the inner and outer edges of the gates are lugs entering segmental grooves formed in the hub and rim; these lugs rest on springs. The weight and pressure of the water on top of the gates swing one end downward, thereby opening them to discharge the water. The springs are compressed by the lugs, according to the pressure of the water supplied, and the gates are thus kept open as long as the pressure is exerted, and close or open still more if the pressure be diminished or increased; this permits the pressure of the water to be kept the same inside of the casing, whether the gates are fully or only partially open.

**Cleaning Water Pipes.**

An experiment of cleaning main water pipes of incrustations by means of chemicals was successfully accomplished last year in Leipzig. The main pipe between reservoir and the pump, 28 miles long and 15 1/2 inches in diameter, was covered with incrustations about one inch thick. The cleaning lasted two months, and during this period the main pipe was filled eight times with solution of hydrochloric acid, three times with solution of soda, and once with solution of chloride



**WINEGAR'S IMPROVED METAL TONGS.**

of lime. By this means the incrustations were entirely removed, and the gauges at the pumps showed pressure 30 pounds less than before.

**California Sea Lions.**

The thousands of sea lions which occupy the bays and coast near San Francisco are under the vigilant eye of the Fish Commission. The animals are very voracious, and are stated to devour hundreds of thousands of pounds of edible fish daily. The fishermen declare that they make hard times in their business. Their curious manner of living upon the rocks around Golden Gate makes the beasts one of the sights of the city, and one seldom neglected by tourists. It may be decided to protect the lions within a national reservation instead of trying to exterminate them. They will be made the subject of an exhaustive report to the Commission.