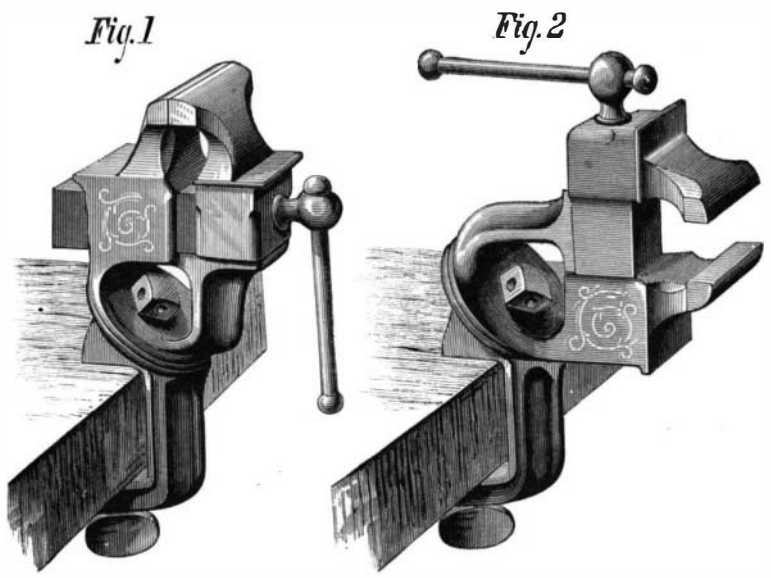
IMPROVED VERTICAL AND HORIZONTAL VISE.

Vises are common that swivel upon a vertical axis, also upon a horizontal axis, but in both cases the jaws always stand in vertical planes. Other vises for holding saws to file turn on a ball and socket joint, allowing a variety of positions to the jaws, varying from vertical, but not approaching horizontal.

The vise here illustrated is so hung upon an angular swivel that a half revolution upon its base brings the jaws from a vertical position (shown in Fig. 1) to a horizontal position (Fig. 2). In their passage from one position to the other, the jaws occupy every angle of inclination, and the vise may be fastened to its base in any position. Our illustration represents a jeweler's portable or clamp vise, arranged to fasten to any table without marring it. The two plates of the swivel are faced true, and held together very firmly by a central bolt, which may be made fast by a tenpenny nail as a lever to turn the bolt. The larger vises turn upon a large cylindrical bearing which projects into the lower plate, the plates and bearing being turned true, and the binding bolt, or nut, is turned by any wrench beneath the bench. It may be changed from one position to the other in a few seconds. Work in the shape of broad thin pieces, and many other forms, must be held by the sides upon which it is desired to work, and, held in the old-style vertical vise, the position is often very awkward. With this vise pieces may be held with any part face up, or in any desired position. It is claimed to cost no more than any first class swivel vise. For further information address the inventor and manufacturer, W. X. Stevens, East Brookfield, Mass.



STEVENS' VERTICAL AND HORIZONTAL VISE.

Hearing through the Teeth.

It is not every man who can hear with his teeth better than with his ears, but there are two or three employés of the water works who can tell whether water is passing through a pipe by resting the teeth on a stopcock and stopping both ears with the fingers. The operation was performed recently in front of the Massasoit House, where a pipe was supposed to be obstructed. In this case the workman held one end of a small metal rod in his teeth, allowed the other end to touch the top of the stopcock, covered both ears, and quickly said, "I hear a small quantity of water passing through the pipe."—*Springfield (Mass.) Union.*

THE ROBERTS ENGINE.

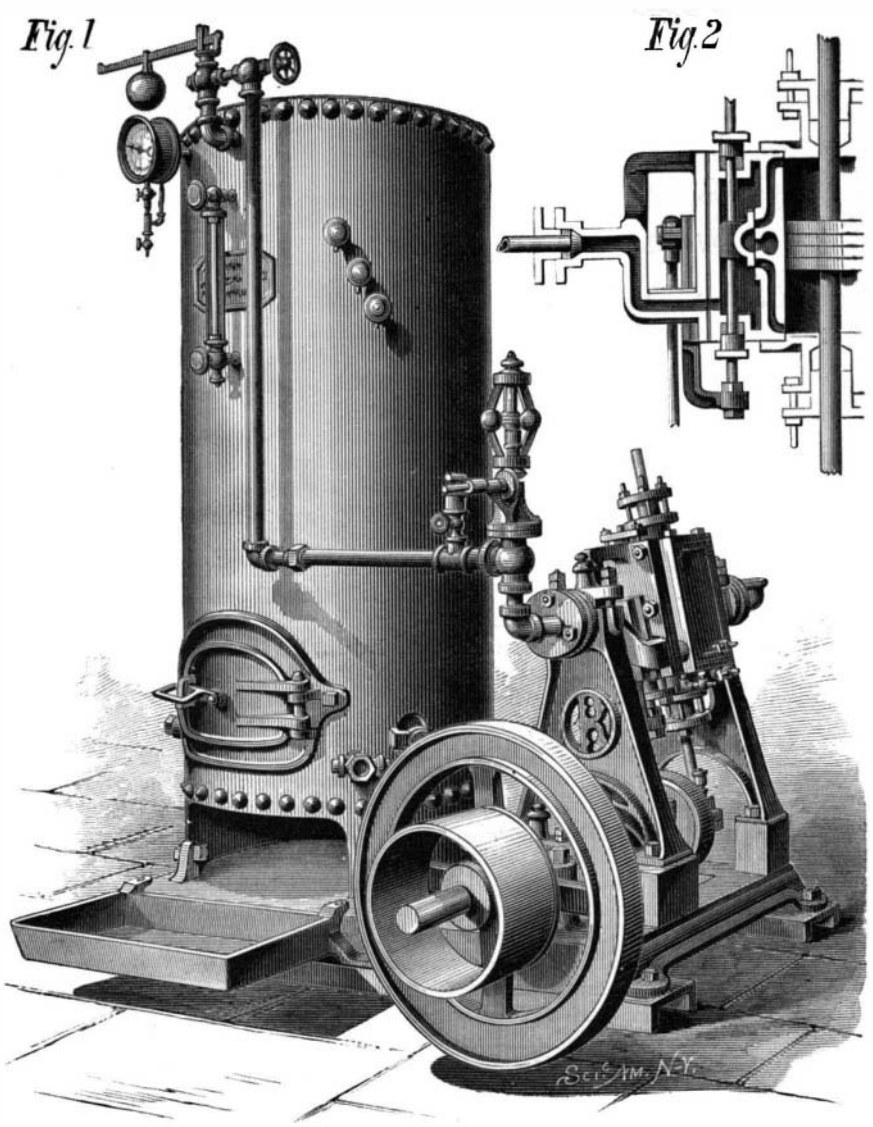
We illustrate herewith a new engine, which is constructed either in portable or detached form, or for marine purposes. The manufacturer claims that it is the cheapest reliable engine in the market; that it is easily cared for, as there are only the crank pin braces to key up; that the piston and valve are so arranged that they cannot wear to a shoulder; that all wearing parts are adjustable and can be taken up; and that the best material is used throughout. It is also claimed to be free from the usual disadvantages of the oscillating engine, through the employment of the following device. The stem of the slide valve passes entirely through the steam chest, and is connected at the lower end with a yoke. This yoke passes (between guides) up on the back of the steam chest cover, and has a steel pin inserted in it at a point exactly in the center of oscillation of the cylinder. The eccentric rod passes vertically between the two lower divisions of the steam trunnion, and connects with this pin. It will be seen that, connected in this way, the oscillation of the cylinder does not affect the motion of the eccentric as transmitted to the valve.

The leakage of the trunnions is obviated by making the bottoms of the trunnion stuffing boxes similar to ordinary circular valve seats. The end of the steam or exhaust pipe has a collar welded on it, which is turned up like a valve to fit the seat at the bottom of the box, and forms a false bottom for the box. A couple of turns of packing on the back of this valve (or false bottom) are then compressed by the gland, and the box is entirely steam or water tight.

It will be seen that, the pipe and valve being stationary, and the seat or bottom of the box moving with the cylinder, there is a continuous motion between the two, thus keeping the valve "ground in" tight, and the longer the engine runs the less liable the trunnions are to leak. The piston rod, valve rod, and all connections are of steel. The cylinder heads are recessed into the cylinder, with bearings, filled with anti-friction metal, under the piston rod stuffing boxes. The cylinder, the jacket, the steam chest, and exhaust trunnion are cast together in one piece. The steam chest cover and steam trunnion are also cast in one piece. The steam trunnion and casting, after passing through the bearing, or box, on the side frame, is divided into three parts, each of which is connected with the steam chest cover at different points. These are hollow, and allow the passage of the steam from the trunnion proper into the steam chest. The passage of the steam from the steam chest into the cylinder is regulated by a three-ported slide valve of the usual shape, having sufficient lap to act as an expansion valve, cutting off the steam at, say, five eighths of the stroke, and thus, by using the elasticity of the steam already admitted, forcing the piston to the end of the stroke without further expenditure of fuel. The exhaust steam then passes all around the cylinder, between it and the square external jacket, to the exhaust trunnion, thus keeping the cylinder hot, and preventing loss by radiation of heat from the steam in the cylinder while doing its work. Our illustration represents the portable form of this engine, wherein it is combined with a vertical tubular boiler, on rolled channel iron skids, in such a manner that either the engine or the boiler can face in either of three different directions, and be thus adapted to the position it is intended to occupy. The boiler is made of the best standard charcoal iron throughout, and tested to 175 lbs. hydrostatic pressure to the square inch, and insured. The outer shell of boiler is extended below the boiler proper so as to form an ash pit, and keep the bottom of the boiler free from ashes and dampness, thus avoiding the rapid deterioration usual in that part. This style of boiler is claimed to secure the greatest possible depth of water over the crown sheet, avoiding the liability to being burned, and does not require any fusible plug, such as has been adopted for safety where there is but a small body of water over the crown sheet. The boiler has an unusually large amount of heating surface in the tubes, it being at the rate of twenty-five square feet of heating surface to one square foot of grate, thus insuring that a very large proportion of the heat will be taken up by the water before the escape of the heated draught into the chimney.

It is stated that a tube can be removed and replaced in thirty minutes, and that steam can be raised in twenty minutes. The whole furnace is entirely surrounded by water, which is heated on the crown sheet and among the tubes (which are in the center of the boiler), rises, gives off its steam, and descends next to the comparatively cool outer shell. The circulation carries all foreign substances which make scale to the bottom, from which they can be removed periodically through the hand holes, or, when under steam, by means of the blow cock. For feeding purposes an injector is used. A cast iron base plate of handsome pattern is furnished with each boiler, the latter being bolted to lugs on the same, and both the base plate of the boiler and that of the engine firmly bolted to skids made of rolled channel iron, instead of the usual timbers, thus insuring lightness combined with great strength. The whole design is attractive, handsomely finished, painted striped, decorated, and varnished, and leaves little to be desired in appearance.

This engine is designed for use wherever a small power is desired, and is at present made in two sizes, six and ten horse power. It is well adapted for printing, grinding apples, sawing wood, ginning cotton, or running small shops, and is well suited for use as a hoister or an elevator engine; and it works well in pairs at an angle of 90°. We are informed that it has hoisted 100 bales of cotton out of a vessel in twenty-eight minutes, this being very rapid work when the bales are hoisted and manipulated singly. For further information as to price, etc., address Mr. E. E. Roberts, 107 Liberty street, New York city.



THE ROBERTS ENGINE.

Respiration at High Altitudes.

At a late meeting of the Royal Society Dr. William Marcet communicated a paper on "An Experimental Inquiry into the Function of Respiration at Various Altitudes." His experiments were mainly undertaken with the view of inquiry into the state of the respiration of tourists at various altitudes, and under the different circumstances met with on Alpine excursions. Pettenkofer's method was adopted in the estimation of carbonic acid, and the experiments were many in number. The ori-nasal mask worn to collect the air breathed out, and the india rubber bags that received the breath, were described. Dr. Marcet confirmed previous experiments in the fact that the quantity of carbonic acid breathed out is greater after food has been taken, and in his experiments on respiration at high altitudes he endeavored to neutralize the effect of food by taking an early breakfast and a late dinner and doing the climbing between the meals. Experiments were made at the Breithorn, 13,685 feet; St. Theodule, 10,899 feet; the Riffel, 8,428 feet; St. Bernard, 8,115 feet; and the Lake of Geneva, 1,230 feet. In experiments made while sitting, Dr. Marcet finds that there is an increase of carbonic acid breathed out as a person rises above the sea on a mountain excursion, and that this is due to the fall of the atmospheric temperature, and to the cold produced by increased evaporation from the body, arising from the diminished pressure of the atmosphere. In short, more carbonic acid is formed in the body to counterbalance the influence of cold from the causes just mentioned. If on ascending to a higher level we should find the same atmospheric temperature as we left at the lower station, still an increased amount of carbonic acid would be expected on account of the cold due to the greater cutaneous and pulmonary evaporation. Dr. Marcet experimented in a similar manner while ascending hills. Walking up rapidly over rocks and grass patches yields most carbonic acid, the amount being 3·155 grms. per minute, which, he said, was attended with the inhalation of the largest volume of air breathed. Ascending quickly at the height of St. Theodule caused a considerable elimination of carbonic acid through the lungs, amounting to 2·972 grms. On the other hand, walking leisurely uphill at the St. Bernard gave rise to the production of no more carbonic acid than quick walking on the level ground at that same station.

Water in the Ears.

A timely warning, to those about to enjoy the summer luxury of sea bathing, is given in the *Medical Record*, by Dr. Sexton, of the New York Ear Infirmary. He finds salt water to be peculiarly irritating to the delicate membrane

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