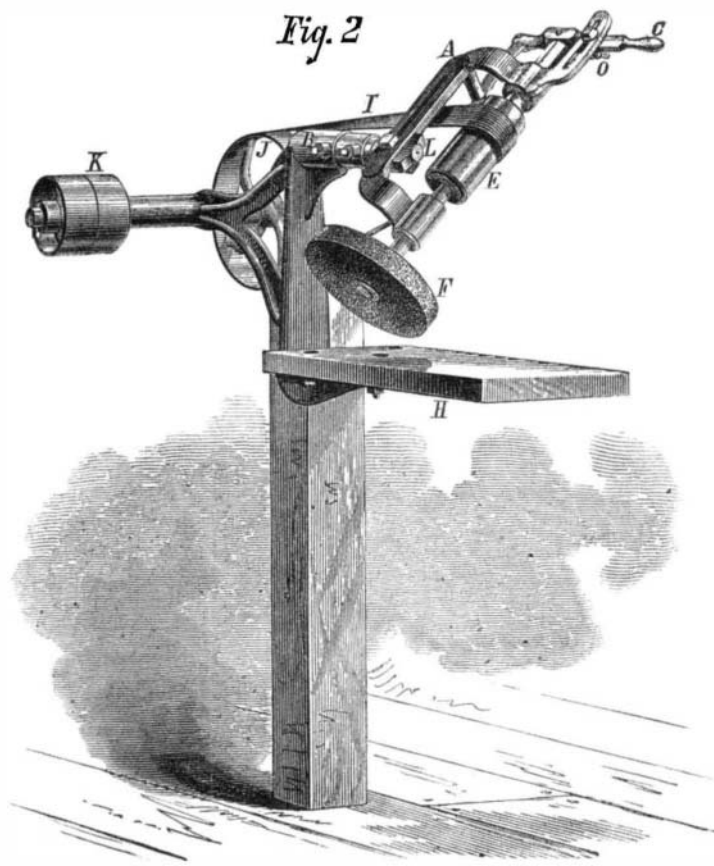
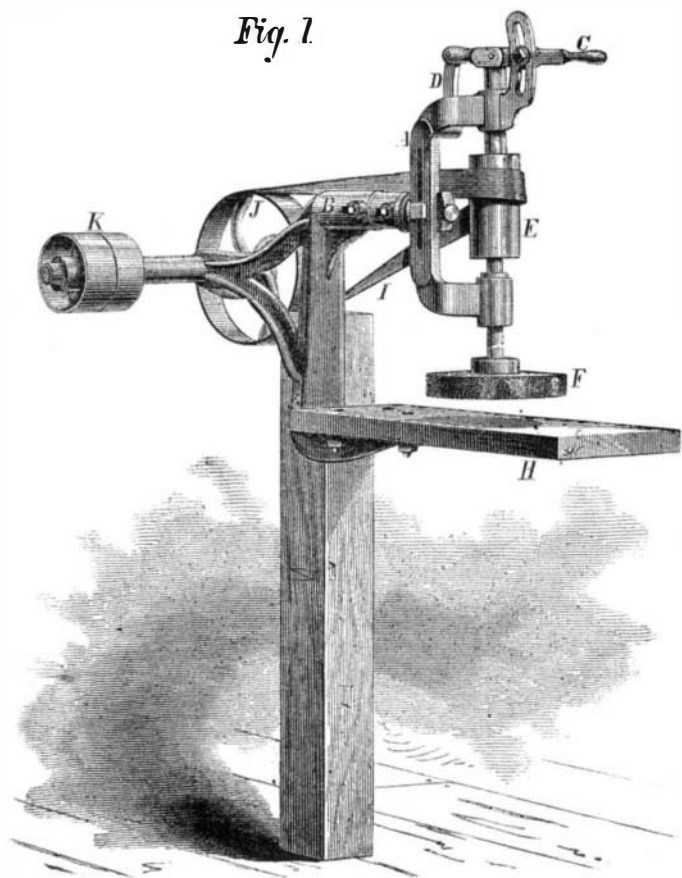


IMPROVED UNIVERSAL GRINDER.

The new emery grinder herewith illustrated is so constructed as to facilitate operations upon a large class of work done by machinists, stove fitters, and others, which cannot conveniently be performed upon horizontal machines. The principal feature of the device is the manner in which the wheel may be adjusted to work at any angle by simple mechanism, involving the use of no extra pulleys and belting.

ly among these may be mentioned the means by which homogeneity of structure is attempted to be secured. In ordinary practice steel is at present, to a large extent, cast into ingots which are honeycombed more or less by bubbles of gas distributed through the structure; and after solidification has taken place, it is attempted to displace these bubbles by the process of cogging, hammering, and rolling the material while in a heated state. During the earlier stages of this

procedure. In casting ingots it not unfrequently happens that the bubbles of gas are largely formed near the outer surface; and during the processes of reheating, these bubbles are apt to be opened up by the wasting of the surface, thus affording opportunities for the entrance of dirt and the formation of scale within the bubble cells, and, as a necessary consequence, interfering with the obtaining of a solid homogeneous mass. Under these circumstances, and inasmuch as



SANFORD'S UNIVERSAL GRINDER.

Fig. 1 shows the grinder arranged for acting upon vertical work; in Fig. 2 the wheel is represented inclined.

The wheel shaft is mounted in bearings in the frame, A, which, by means of a set screw passing through a slot, is secured to a shank which enters a socket on the standard, B. The shank, by loosening the set screws which confine it in the socket, can be drawn out to tighten the belt which, acting on a pulley on the wheel mandrel, rotates the wheel, or it can be turned in the socket so as to set the latter at any angle. By means of the slot and setscrew in the frame, the wheel can be adjusted nearer to or further from the table, as desired. The mandrel has several inches traverse in the frame, so that the pulley can be pressed down or lifted from the work by means of the simple lever arrangement at C. The lever may be set and held at any position by means of the nut shown, or the former may be counter-weighted and operated by a treadle beneath the table.

In order to grind flat surfaces the wheel is lowered down to them. A conical wheel is used for grinding holes in stove plates, etc., an aperture being made in the table or an auxiliary platform thus provided being secured on top of the latter. For edging plates, the table can be made of sufficient size to sustain the whole weight of the plate, so that the attendant can bring a more even pressure on the wheel with little labor and without danger of injuring it. The wheel can be inclined so as to grind bevel edges with readiness; and by suitably formed grinders, moldings can easily be ground.

The machine is manufactured by the Tanite Company, of Stroudsburg, Pa., who may be addressed for further particulars.

COMPRESSED STEEL.

The manufacture of steel in large masses, although it has made vast strides during the past few years, is still characterized by many features requiring improvement, and especial-

treatment, the steel is tender and requires to be dealt with carefully; but in proportion as its homogeneity increases, it becomes fit to resist more severe handling, the increase in its toughness, doubtless, to some extent, marking the expulsion of the gas bubbles and the welding together of their sides under the various compressing processes the material undergoes. It is undoubtedly true that this mode of treatment, when skillfully carried out as it is at our large works, gives excellent results, and produces a most valuable structural material; but it is equally true that it is far from being free from objections, while it is in some respects opposed to what may be theoretically considered the rational mode of

it is at present scarcely possible to prevent the formation of the gas bubbles in the ingots during the process of casting, so long as the ordinary plan of teeming them in metal molds is adhered to, it is not surprising that the idea early suggested itself of getting the desired homogeneity by subjecting the metal to compression while in a liquid state, instead of allowing it to solidify before attempting to remove the bubbles. Such a mode of procedure is certainly a rational one, if we allow for the moment that the casting of perfectly solid ingots is at present unattainable in regular practice; and notwithstanding the practical difficulties attendant upon its being carried into effect, it is somewhat surprising that greater progress has not been made in its general application.

The plan of increasing the solidity of castings by compressing the metal while in a molten state is very far from being new; and as applied to copper, it has been in use in Manchester, England, for about twenty years past. As regards steel, the credit of suggesting its compression in the fluid state belongs, we believe, to Mr. Bessemer, who embodied the idea in one of his earlier patents; but in England it has in practice been worked out almost solely by Sir Joseph Whitworth, who for some years has been engaged in developing the system, and of whose success we shall have to speak presently. It was in France, however, we believe, that the process was first practically carried out on a large scale, Messrs. Révillier, Biétreix & Co., of St. Etienne, having adopted it in 1867, and having built steel works specially arranged for it in connection with furnaces for making steel by the Siemens-Martin process. According to the plans adopted by Messrs. Révillier & Co., the metal was run from the furnace into a ladle, which, by means of a turntable crane, was conveyed to the ingot molds, and the metal teemed into the latter. The molds were placed on an ingot carriage, and after filling they were run under a hy-

Fig. 1.

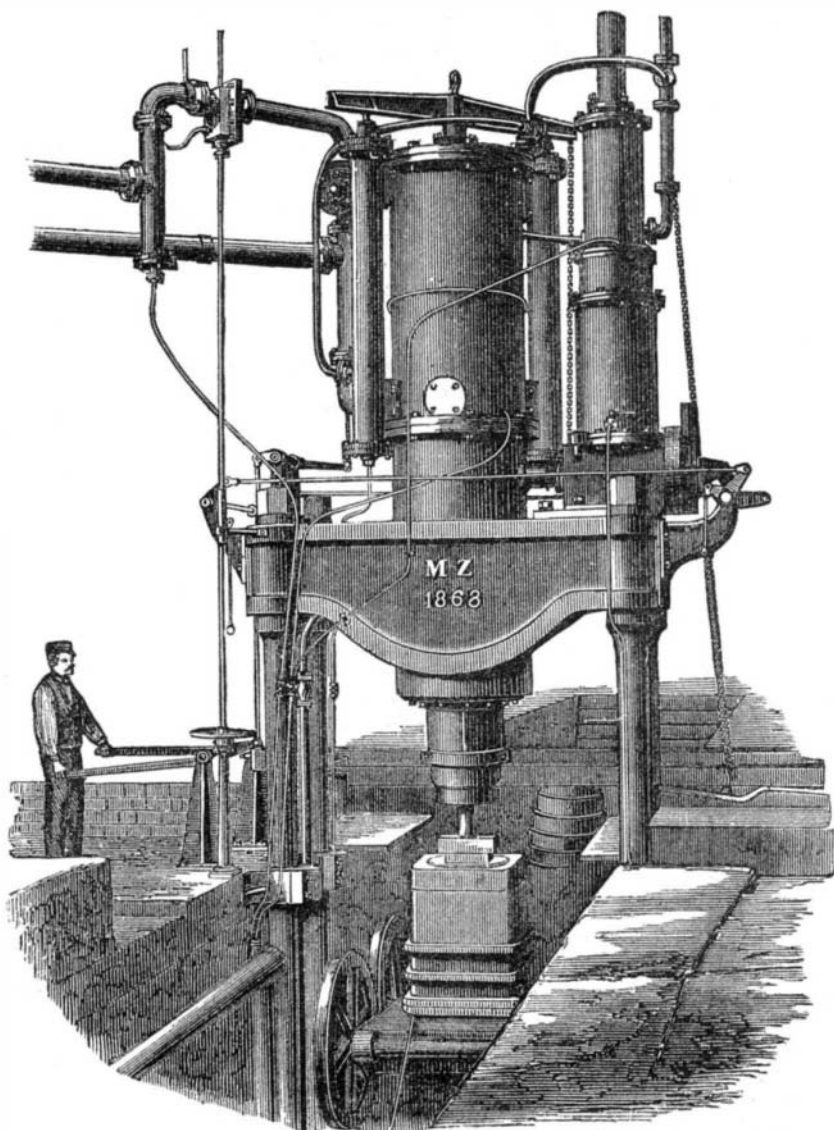


Fig. 3.



HYDRAULIC PRESS FOR COMPRESSING STEEL.