THE ÆTNA PATTERN GRATE BAR.

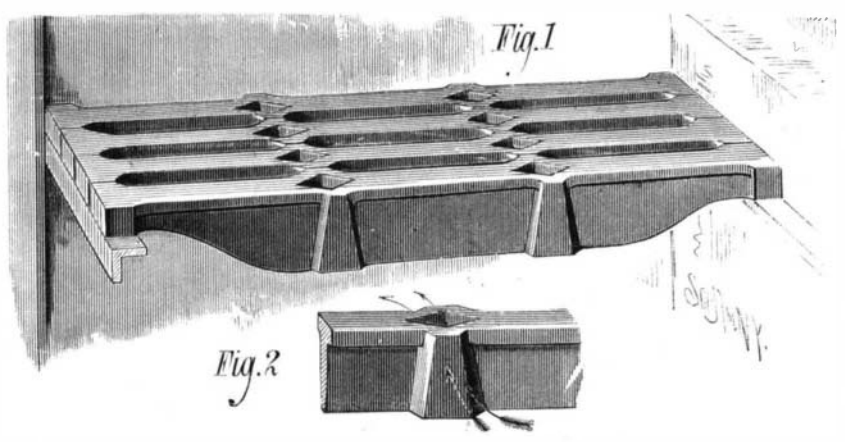
We give an engraving of an improved boiler grate bars of which the special feature is an expansion shoulder that secures the grate against twisting, buckling, and warping. Engineers always notice that for some time after a new set of grate bars are put under a boiler the fire is more uniform and the consumption of fuel perceptibly less, this being due to the regular and evenly divided openings in the grate surface, which give a uniform and well distributed quantity of air, thus securing perfect combustion. It is, however, but a short time before the bars begin to twist and warp out of line; this is caused by the solid shoulders preventing the necessary expansion sideways, resulting in large openings between some bars and corresponding smaller openings between others.

The smaller openings do not furnish sufficient air for proper combustion, while the larger openings admit too much air and waste considerable fuel by allowing it to drop unconsumed into the ash box.

Too much care cannot be used with reference to the grate bars under a boiler, as here usually is the greatest waste about an establishment, and where the cost of fuel is an item, the price of a set of grate bars is nothing compared to the waste in fuel caused by incomplete combustion

Various devices have been patented to obviate these difficulties, but most of them are complicated and expensive, and, therefore, have not come into general use.

All engineers will agree that of the common grates those are best which are cast single, being moulded on the side, thus securing the best metal on the face of the bar.



THE ÆTNA PATTERN GRATE BAR.

The Ætna bar is a single piece with a diamond opening cored through the shoulders, so that each bar will take up its own expansion and thus prevent twisting and warping. These bars are cast on the side, and are made from metal especially adapted to contact with fire.

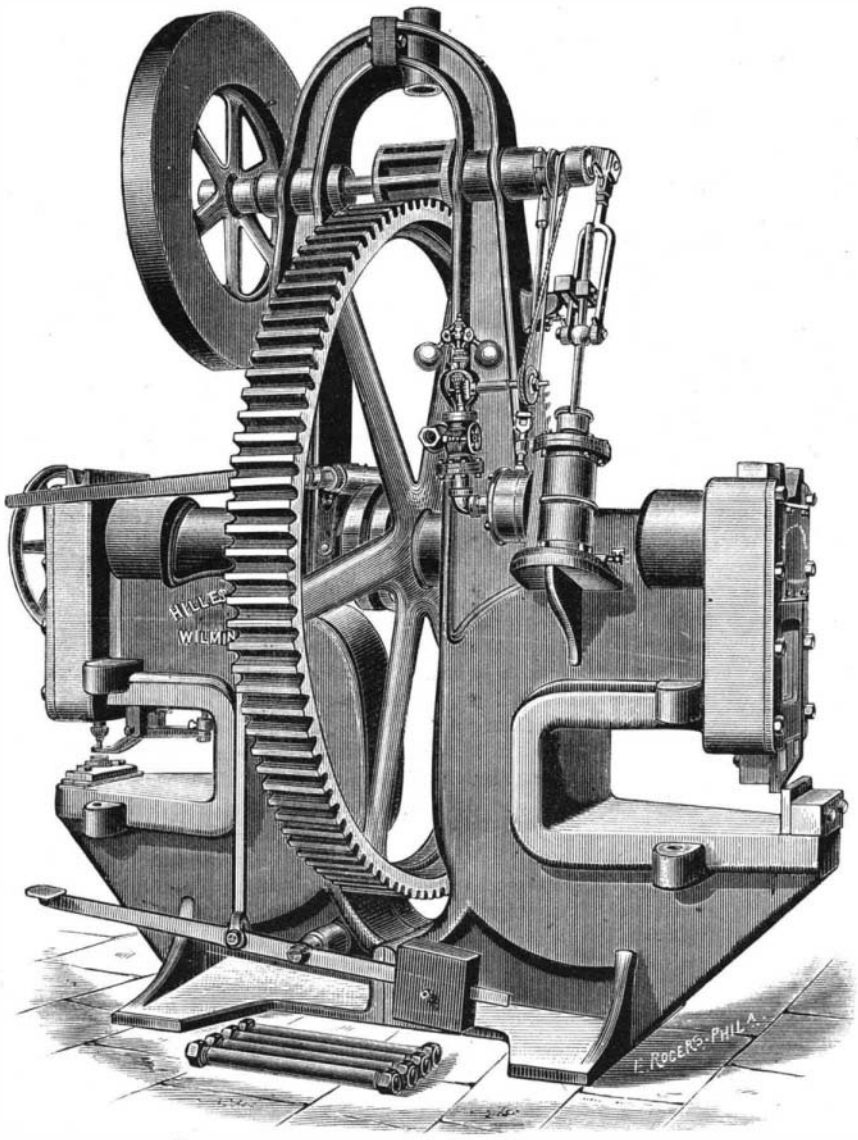
Another great advantage of the Ætna bar is, that though somewhat lighter than the common bar it is stronger and vastly more durable, and as it is sold at the same price per pound, is therefore cheaper, the manufacturers are thus enabled to make a specialty of these bars and use a special mixture of iron suitable for this purpose. The Ætna grate barsare manufactured by the Ætna Iron Works, Quincy, Ill.

IMPROVED PUNCH AND SHEAR.

We give an engraving of a powerful punch and shear made by Messrs. Hilles & Jones, Wilmington, Delaware. This particular machine is provided with an engine permanently attached to the frame, but they are made either with or without the engine, and are furnished in several sizes. When driven by a belt appropriate pulleys are supplied. The machine is provided with a clutch arrangement controlled by a foot lever, by means of which the punch can be stopped and started. For very particular work a hand wheel is used to set the punch before applying the power. The engraving gives an excellent idea of the construction of these machines.

No. 0 will punch ¾ inch hole in $\frac{5}{16}$ inch iron, 18 inches from edge, and shear ⅜ inch iron. No. 1 will punch ¾ inch hole in ½ inch iron, 20 inches from edge, and shear ½ inch iron. No. 2 will punch 1 inch hole in ¾ inch iron, 20 inches from edge, and shear ¾ inch iron. No. 3 will punch 1¼ inch hole in 1 inch iron, 25 inches from edge, and shear ⅞ inch iron. No. 4 will punch 1½ inch hole in 1¼ inch iron, 25 inches from edge, and shear 1⅛ inch iron.

Messrs. Hilles & Jones are prepared to supply either the punch or the shear separately, and of heavier or lighter patterns.



HILLES & JONES' COMBINED PUNCH AND SHEAR.

Substitute for Cod-liver Oil.

It is claimed by a writer in *Nature* that the oil of the "oolachen" or "ulikon," the candle-fish of Alaska, possesses all the medicinal qualities of cod-liver oil. This fish has long been an ichthyological curiosity, and has been noticed by almost every traveler who has visited the coasts of British Columbia and Southern Alaska. It is a small silvery fish, averaging about fourteen inches long, and in general appearance much resembling a smelt. It is the fattest of all known fish, and affords a very superior oil when tried out. Dried, the fish serve as torches. When a light is needed, the tail is touched to the fire, and they will burn with a bright light for some time. No description can give an adequate idea of their numbers when ascending the rivers from the sea. The water is literally alive with them and appears to be boiling. These fisheries appear not to have been hitherto utilized except by the natives, who esteem the ulikon as a great delicacy. The oil at present is said to be gaining a high reputation in this country, and has recently been introduced into England, where it will probably take "a prominent place as an important medicine."

The Value of Wide-awake-itiveness.

A certain degree of tension is indispensable to the easy and healthful discharge of mental functions. Like the national instrument of Scotland, the mind drones woefully and will discourse most dolorous music, unless an expansive and resilient force within supplies the basis of quickly responsive action. No good, great, or enduring work can be safely accomplished by brain force without a reserve of strength sufficient to give buoyancy to the exercise, and, if I may so say, rhythm to the operations of the mind. Working at high pressure may be bad. but working at low pressure is incomparably worse. As a matter of experience a sense of weariness commonly precedes collapse from "overwork;" not mere bodily or nervous fatigue, but a more or less conscious distaste for the business in hand, or perhaps for some other subject of thought or anxiety which obtrudes itself. It is the offensive or irritating burden that breaks the back. Thoroughly agreeable employment, however engrossing, stimulates the recuperative faculty, while it taxes the strength, and the supply of nerve force seldom falls short of the demand. When a feeling of disgust or weariness is not experienced, this may be because the compelling sense of duty has crushed self out of thought. Nevertheless, if the will is not pleasurably excited, if it rules like a martinet without affection or interest, there is no *verve*, and, like a complex piece of machinery working with friction and heated bearings, the mind wears itself away and a breakdown ensues. Let us look a little closely at this matter.—*Dr. J. Mortimer Granville on "Worry"—Popular Science Monthly.*

NEW INVENTIONS.

An improvement in rail fences, which admits of the fence being laid in a straight line, and effects a great saving in labor and fence material, has been patented by Mr. Leonard J. Murphey, of Wauseon, Ohio. This improvement consists in a combination with the post and rails of a fence of a rectangular frame composed of vertical side bars and horizontal bars secured at their ends to the side bars, and at the center of their length to the post, whereby spaces are formed on each side of the post for the reception of the rails, which need not be secured.

Mr. James Denton, of Amsterdam, N. Y., has patented an improved attachment for knitting machines. The improvement is designed to provide for making knit fabrics with horizontal, vertical, or diagonal stripes, or other patterns of one or more colors, without breaking the thread whenever the color is to be changed. The machine to which the attachment is to be applied has the usual barbed knitting needles, and a sinker and a presser wheel operating in combination with needles. It also has a thread guide, through which duplicate threads pass, attached to the bearing of the presser wheel. The attachment, which operates in concert with these devices, has a vibrating looped lever for guiding one of the threads and for exposing it on the outside of the fabric, a supplemental lever connected to the looped lever, a reciprocating adjustable cam which is removably secured to the supplemental lever, and a pair of wheels, operated one by the other, and provided with detachable laterally projecting pins for giving a reciprocating movement to the cam and vibratory movements to the levers, for the purpose of making stripes and other patterns, the number of detachable pins employed regulating the exposure of the thread carried by the looped lever in the pattern. For making different patterns, various changes require to be made, and numerous other details enter into the general combination, which is very ingenious.

William Driscoll, of Taunton, Mass., has patented an improved mould for forming crucibles and other articles of plastic material. This invention relates to moulds for forming crucibles and articles of pottery ware, and it consists in a skeleton frame mould provided with a lining or backing of flexible and porous material. It is preferred to use both a lining and a backing, the latter being of heavier and coarser material than the lining. Springs also may be combined with a two-part mould, for separating the mould after clamping hoops for binding it together have been removed. By employing a porous backing, the water pressed from the composition can escape freely, and the lining will be retained in a comparatively dry condition.

An improved bed attachment for invalids, by which bed-ridden persons may be easily and comfortably attended, has been patented by Mr. Joshua P. Brown, of Crockett, Tex. This invention consists, principally, of a frame pivoted between the side boards of a bedstead and which is provided with a removable seat, the same being adapted to be brought into a vertical position for supporting the invalid in a sitting posture. The head piece and side arms of this frame have secured to them a supporting strip of canvas, which is fastened at its bottom to a sheet of like material that is firmly secured at its front end to the head-board of the bedstead, and passes at its opposite end over a roller, by which it may be slackened, or be stretched and held taut, accordingly as it is desired to adjust the invalid into a sitting or a recumbent position. These two canvas attachments, which form the back of the frame, constitute the bed bottom, on which the mattress may be placed. The removable seat consists mainly of an upper board having an opening in it which may be covered by a pivoted cushion, a bottom board provided with means for holding a utensil, and flexible or hinged connections between said boards. This seat is supported by the side arms of the pivoted frame and constructed to engage with hooked hinged arms which serve to retain the seat in position between the side arms of the frame, and so form an easy and secure support for the patient.

An improved bail for handling barrels, which greatly economizes labor and facilitates the movement from place to place of filled barrels, has been patented by Messrs. James Casey, Sheldon Juniper, and John H. Mitchell, of Savannah, Indian Territory. The invention consists of a handle rod sliding in a bar to the ends of which are pivoted two angular arms having studded and swiveled griping plates at the lower ends, to which handle-rod the upper slotted ends of the bent arms are held loosely, said handle-rod being provided with a series of transverse grooves, in which a latch pivoted on the transverse bar catches. The swiveled griping plates are pressed