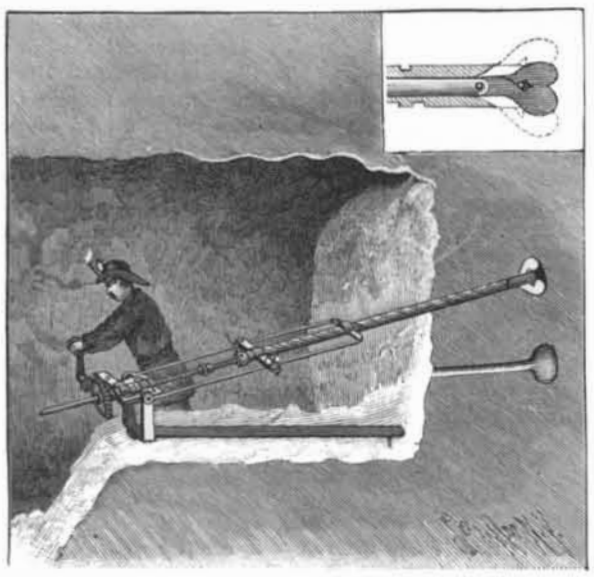
A DRILL TO FACILITATE BLASTING.

The illustration represents a drill specially designed for boring into coal banks, and adapted to form at the end of the bore a pocket for the reception of a large amount of powder, thus increasing the effectiveness of the blast and lessening the liability of blowing out the tamp. A bar or base piece has on its under face near one end a spur adapted to be driven in a proper supporting position, and near the outer end of the bar is pivoted a yoke having sockets in which is held a horizontal guide box. The latter is made in hinged sections, which, when locked, form channels for the reception of a drive shaft having a longitudinal face



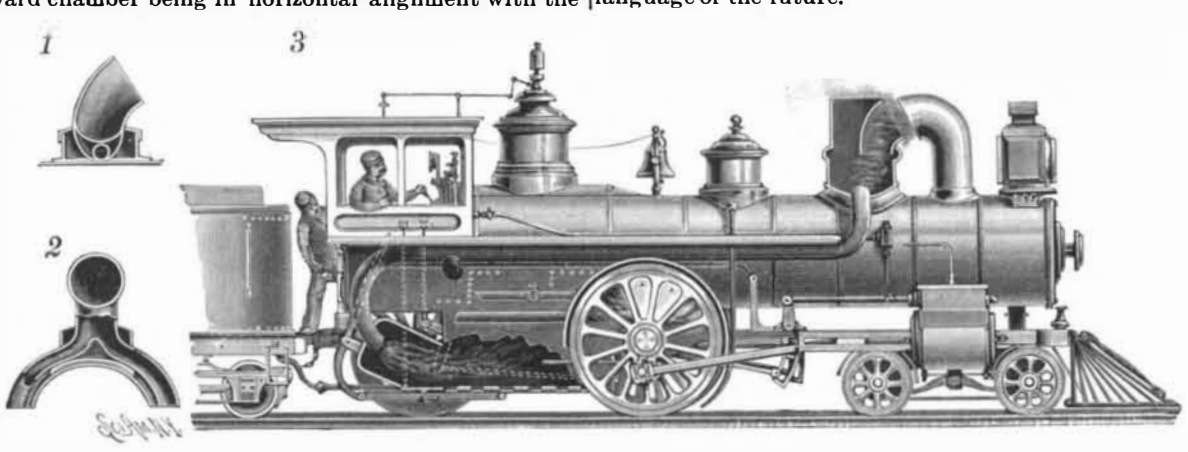
WATTS' POCKET-FORMING DRILL.

groove, and a polygonal socket at its forward extremity. Connected with the drive shaft at the rear of the guide box is a spur wheel meshing with a pinion, through which, by means of a crank, the shaft is revolved. The extremities of an elongated U-shaped frame are pivoted on the trunnions of the guide box, and upon this frame is a hinged sliding clamp, with a clamping screw to draw its members together. The clamp has central channels adapted to receive the circumferential recessed surface of an externally threaded bit rod casing, which also has a spiral external groove extending nearly from end to end. The bit, held in the outer end of the casing, consists of two members having approximately circular heads with outer cutting edges, and integral shanks pivoted to the outer end of a bit rod, as shown in the small figure, the rod being capable of longitudinal movement in the casing, and its other end being connected with the forward end of the drive shaft. When the hole is being drilled the members of the bit overlap one another, and extend but a slight distance beyond the casing, but when the hole has reached the desired depth, the thumb screw of the clamp is tightened to prevent the further forward movement of the casing, while the bit rod is forced outward by the further operation of the drive shaft, causing the bit members to expand to form a pocket at the end of the bore, as shown in dotted lines in the small view. The chips produced in the operation escape through the spiral groove of the casing.

Further information relative to this invention may be obtained by addressing the patentee, Mr. Julius R. Watts, in care of McCullough Bros., No. 124 North Fifth Street, Springfield, Ill.

A LOCOMOTIVE SPARK ARRESTER.

The illustration represents a construction designed to prevent the sparks and cinders of a locomotive from falling upon a train or surrounding lands and buildings, while also facilitating the more complete combustion of the fuel. It has been patented by Mr. Edson J. Hadlock, of Big Spring, Texas. The smoke stack is curved rearwardly, and a spark arrester of the same height as the smoke stack fits upon a box at its rear. The spark arrester is divided by a curved partition into two chambers, the opening of the forward chamber being in horizontal alignment with the nozzle of the smoke stack, while the rear chamber opens into the air, and both chambers communicate with the box below. This box has a double deflector, raised in its central portion, and opening from each side of the box are pipes which extend along each side of the boiler to a point of discharge in a cinder box beneath the cab. Each of these pipes also has a branch opening communicating with the fire box, but these openings are not used at the same time with the openings in the ends of the pipe. Pivoted in the bottom of the cinder box is a damper, a rod from which extends upward into the cab. In the bottom of the ash pan are transverse slots, while there are corresponding slots in a slide adapted to be operated by a lever extending up into the cab, whereby the cinders and ashes may be dumped at convenient points. At the rear end of the ash box is a damper adapted to be operated, through a bell crank, from the cab. It is designed that, with this invention, the ordinary dampers may be dispensed with, sufficient air being admitted through the dampers in the cinder box and at the rear of the ash box. Figs. 1 and 2 represent a modified form of the arrester, attached by flanges to the supporting box on the top of the boiler, the smoke in this form of arrester all passing through the branch pipes into the fire box. In the form shown in Fig. 3, the heavier portions of the smoke are designed to pass downward, while the lighter parts may pass upward from the rear chamber of the arrester.



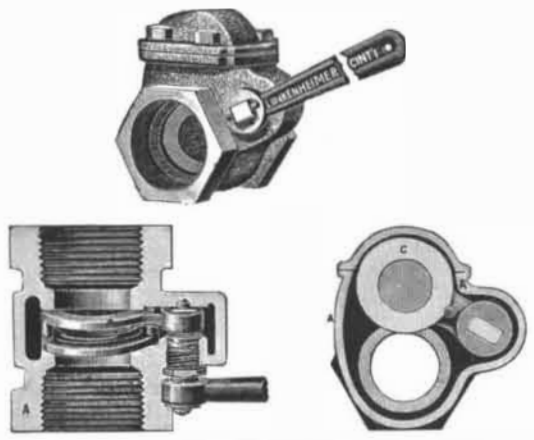
HADLOCK'S SPARK ARRESTER.

Cement which Resists Acids.

The following substance, it is said, will protect cement from the influence of acids: Melt together carefully one part of caoutchouc (India rubber) with two parts of linseed oil, and gradually incorporate with it three parts of white bole, so as to form a plastic mass. This cement is not at all attacked by hydrochloric and but very little by nitric acid. When heated it softens but very little. It does not easily dry upon the surface. *New Remedies* says, if this cement is mixed with one-fifth of its weight of litharge or minium, it dries up in the course of time and becomes hard. This is known as Benicke's cement.

AN IMPROVED GATE VALVE.

The valve shown in the illustration is especially designed for low pressure steam, water, gas, oils, etc. It is a double disk straight-way valve, operated by a lever instead of a wheel, the position of the lever indicating the opening of the valve. The disks are secured to the operating stem and adapted to close against tapering seats in the valve shell, and, having ball and socket



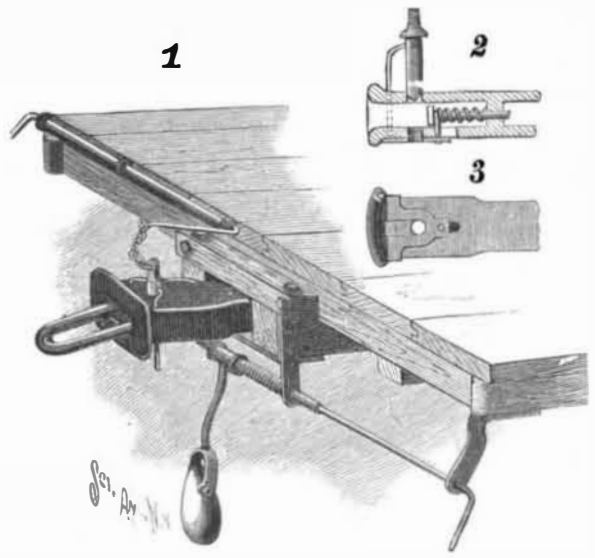
LUNKENHEIMER'S "HANDY" GATE VALVE.

bearings at their back, are evenly wedged against their seats when the valve is closed by the lever. The stem has a tapering flange upon which bears a non-rotating friction washer. This valve is manufactured by the Lunkenheimer Brass Manufacturing Company, of Cincinnati, Ohio, and this company, in addition to its former facilities, has recently purchased the entire plant of the Porteus Manufacturing Company, of the same city.

IT is estimated that in the year 2000 no less than 1,700,000,000 people will be speaking the English language, while only 500,000,000 will be speaking other European tongues. English is thus indisputably the language of the future.

AN IMPROVED FREIGHT CAR COUPLER.

The illustration represents the application of novel attachments to facilitate the coupling of freight cars, without it being necessary for the trainmen to go between the cars, while the construction is such as to be readily applicable to the drawheads now everywhere in use. In the rear of the drawhead opening, as shown in Fig. 2, a coiled spring surrounds a rod having a downwardly extending lug, adapted to move forward and backward in a slot in the bottom of the drawhead. The projecting end of this lug is connected to a movable shoe plate, shown in Fig. 3, and the forward end of this plate is adapted to cover vertical openings in



MARSHALL'S CAR COUPLER.

the drawhead in addition to the regular pin openings. The coupling pin is raised by a lever, whose outer end extends to the side of the car, where it has a handle, the lever being connected to the coupling pin by a short chain. On the coupling pin are forwardly extending vertical arms, adapted to fit within and work through the additional vertical openings, and to rest upon the shoe plate. Normally these arms hold the coupling pin in elevated position, as shown in Fig. 2, but when the shoe plate is moved backward by the entrance of an opposing coupling link, and its pressure against the spring, the pin-supporting arms are released and the coupling pin drops, thus effecting the coupling. The sliding shoe cannot then be moved forward until the coupling pin has been raised to its full height by means of the lever at the side of the car. In order to hold the link in line with the drawhead opening of an opposite car, as shown in the general view, Fig. 1, an operating lever is secured in proper position in suitable hangers, the outer end of this lever having a handle, so that it may be operated from the side of the car. Upon this lever is secured a rod, in the forked lower or outer end of which a weight is pivotally held, the upper end of the weight being of a shape to enter the opening of the loop. Upon the lever, between collars attached thereto and the inner hangers, are spiral springs, permitting the lever to be moved a little to one side or the other when the link hangs at either side of the center line, the link being thus conveniently held in position by the operator at the side of the car. The slack deemed essential in starting and hauling heavy trains is not sacrificed in the use of these attachments, the connections between the cars remaining as at present.

For further information relative to this invention, address the patentee, Mr. J. E. Marshall, Martinez, Cal.

A Gas and Smoke Helmet.

An apparatus likely to be useful in gas works in cases of emergency when valves have to be closed or repairs effected in an atmosphere charged with either coal or carbonic acid gas, or thick smoke, is Kleeman's respirator. The appliance consists of a leather helmet, a bellows, and a hose for connecting the helmet with the bellows. The helmet fits tightly over the head, having a visor with glazed sights very much like an ordinary diver's helmet, only of course much lighter and differently fitted. The fresh air enters the mouthpiece, by means of a suitable connection with the hose; flows round the face and head of the wearer; and finally escapes through a valve on the top of the helmet. The necessary adjustments are very simple; so that any one can learn how to use the appliance after a short trial. The weight of the helmet is only 2⅕ lb., and it is stated that it does not interfere in any way with the movements of the wearer. Since the head is wholly protected by the helmet, the eyes are not incommoded by smoke or acid gases. The bellows are, of course, to be worked in pure air at a distance by an assistant; but the whole arangement is naturally lighter and handier than diving apparatus.

IRON rusts readily in all locations when alternately cold and hot, but particularly with a porous material which prevents the moisture from evaporating freely.