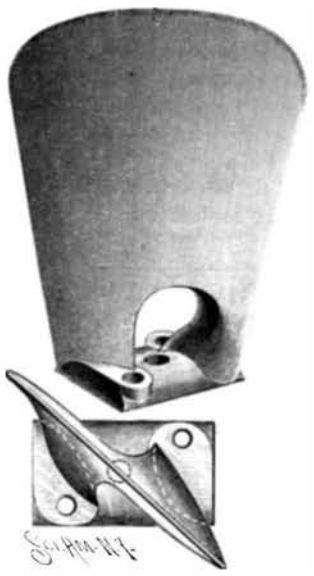
AN IMPROVED PROPELLER BLADE.

This improvement is based upon the assumption that from the end of the blade toward the hub only one-half or three-fourths of the outer portion is the real working part, water being forced inward and becoming dead near the hub requiring more or less power to churn it. By this improvement the dead water is allowed to pass away as soon as it becomes so. The invention forms the subject of a patent issued to Mr. Daniel H. Welch, of Astoria, Oregon. The propeller blade is mounted obliquely upon a flat rectangular base piece, having bolt holes by which it is secured to the hub of the propeller, and there is an oblique water passage through the base end of the acting portion of the blade, the walls of the passage forming acting or propelling extensions of the main or outer acting surfaces of the blade, when it is set angling on its hub or shaft. The smaller figure shows a plan or edge view of the blade, any number of blades being arranged in an angling manner, as in other screw propellers, around the shaft or hub of the propeller. By this construction it is claimed that the dead water will pass away more freely than is possible with a wheel of any other design, the wheel also requiring less power to operate it, and, if properly made, it is designed to be stronger, not to shake the boat as much, and be easier on the rest of the machinery. It can be made solid or as a sectional wheel.



WELCH'S PROPELLER BLADE.

Iron Aluminum Alloys.

The advantages of an addition of aluminum to fluid iron are important. With moderate care absolutely pure and solid castings can be obtained capable of receiving a high polish. An addition of aluminum is especially to be recommended for the manufacture of steam cylinders, engine castings, press cylinders, and generally for castings which are to be subjected to a high pressure. A few hints will serve to show how aluminum is best alloyed with iron. As aluminum only lends itself with difficulty to combination with iron, it is not immediately to be introduced in the ladle which is to be poured into the mould; a smaller ladle is selected, in which is placed the heated aluminum; somewhat fluid iron is brought from the furnace, poured in the ladle, and stirred until the aluminum iron compound begins to stiffen. The iron intended to be cast is now let out of the furnace into the ladle intended for it, the aluminum iron mixture is poured in, the lot being intimately mixed. The molten metal should not be poured into the mould too quickly, as it does not solidify so rapidly as ordinary iron. Aluminum iron in the fluid condition is very active; small globules are formed, which gradually extend to the edge of the ladle, where they disappear. At first the iron is of a milk-white color; then it becomes orange-yellow, and forms a thin film on the top. When this moment has arrived, the film is removed and casting is proceeded with, care being taken that the mould is always kept full. For 100 kilogrammes the proportion of aluminum recommended is 200 grammes. Cost can be no drawback in view of the present cheapness of aluminum, particularly when it is considered with how much greater certainty clean castings can be obtained. Aluminum improves cast iron as phosphorus improves tombac and brass, the thin fluid is increased, and the oxide separated. —*Metallarbeiter.*

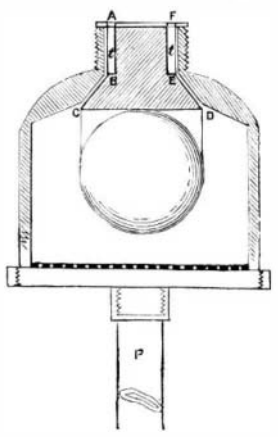
THILANINE.—"This is a new modification of lanolin, obtained by Liebels by the action of sulphur on lanolin, and which is stated to be a definite compound. Dr. Sadlfeld, of Berlin, has experimented with it in his dermatological practice, and reports very favorably on its action in various affections. It gives rise to no irritation and allays all itching, and is said to be destined to supersede Hebra's ointment in dermatological work."—*Br. Col. Drug.*

AN AUTOMATIC BOILER FEED.

A patent has recently been granted to John R. Hanlon, of Pennington, N. J., for an automatic feed water apparatus, by the use of which a regular supply of water to low pressure steam boilers is at all times automatically secured. The operation of this apparatus is based upon the principle of water seeking its level.

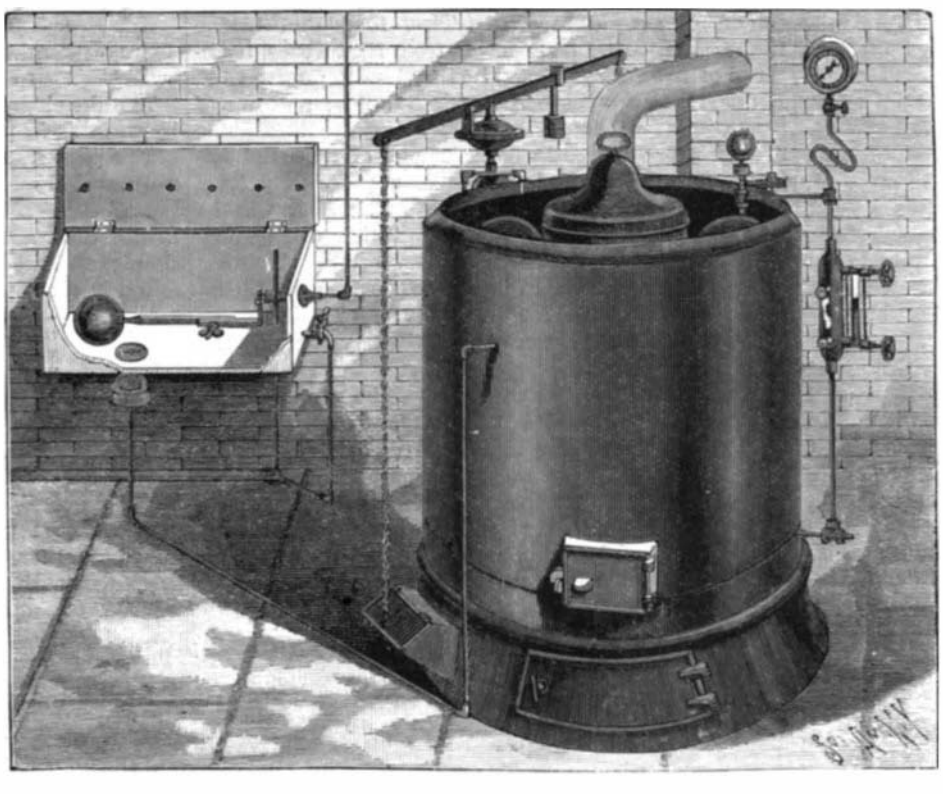
The arrangement consists of a tank furnished with two valves; one, an automatic float valve connected with the water main and regulating the supply of water to the tank, while another small float valve is fastened to the bottom of the tank and connected therefrom directly with the boiler. This last mentioned valve is governed by the flow of water into the the boiler and by steam pressure from the boiler. When the steam pressure is off or very low and the height of the water in the boiler is below the pre-established level, the water in the tank, seeking its proper level in the boiler, forces the valve from its seat and the flow into the boiler begins. The supply valve maintaining the same level of water in the tank, the flow from this valve in the bottom of the tank will continue until there is a corresponding level of the water in the boiler. When this point is reached, the downward pressure upon the valve ceases and the valve in virtue of its floating quality is lifted against its seat and closed, thus preventing the possibility of backward pressure from the boiler forcing the water back into the tank; in fact, the stronger the pressure, the tighter this valve binds to its seat. One form of this valve is shown in the detail sketch.

A fine wire gauze screen connected to the inlet valve prevents foreign matter from entering the tank from the main, while another similar screen attached below the float valve in the bottom of the tank prevents anything in the way of scale from the boiler reaching this valve. Thus the possibility of this valve becoming clogged is the least possible; in fact, practically removed. The pipe connecting the apparatus with the boiler enters the boiler 10 or 12 in. say, below the established level. Thus, even assuming the remote contingency of the drop valve becoming accidentally stopped and prevented from closing tightly, yet the water could not be forced from the boiler below this point of connection. That is, it is impossible for the boiler to be emptied through any accident to the apparatus.



The arm of the float of the inlet valve is sectional, the two parts being regulated by a thumb screw. The tank is fastened to the wall of the boiler room approximately at the height desired for the water level in the boiler, and the height can be accurately fixed by simply loosening this thumb screw and turning the arm of the float up or down; up to lift the level and down to lower it, and then retightening this screw. In other words, you can adjust the level of the water in the boiler by a very simple method.

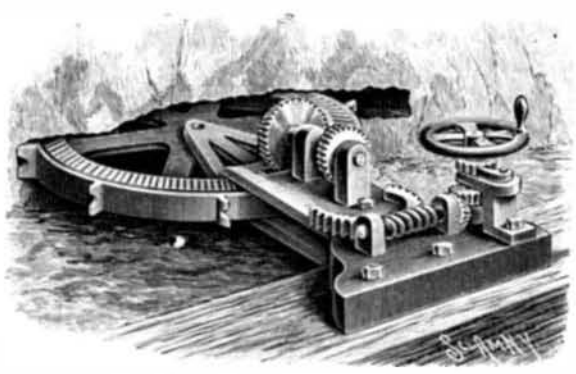
A check valve attached below the escape valve of the boiler admits the atmosphere over the surface of water in the boiler when the steam pressure is removed. Thus is destroyed any tendency to form a vacuum over the surface of water in the boiler. Consequently, the pressure upon the water in the tank and boiler being equalized, the water is enabled to attain a corresponding level in each.



HANLON'S AUTOMATIC WATER FEEDER FOR LOW PRESSURE STEAM BOILERS.

AN IMPROVED COAL MINING MACHINE.

The machine shown in the illustration, for cutting coal in coal mining, is designed to be operated by an electric or other motor placed on the machine, the latter being advanced by hand or power as the cutting goes on, until the body of the coal to be detached is undermined. The improvement has been patented by Mr. James Taylor, of Edwards, Ill. A stationary frame is secured to any suitable fixed support, and two forwardly-extending arms are pivoted to the frame, the cutting wheel being journaled between the free ends of the arms. The cutters in the rim of the wheel are removable, their shanks extending through the rim and receiving nuts. On the upper face of the cutting wheel is a toothed rim, engaged by a bevel pinion on a shaft journaled in bearings on the upper pivoted arm, this shaft also having a spur wheel for receiving power from an electric or other motor. On the rear of the arm is also a segmental worm wheel, concentric with the pivotal bolt, a worm journaled on the frame engaging the worm wheel. The worm shaft has a bevel gear, engaged by a corresponding gear on a short, vertical shaft, provided with a hand wheel, the shaft also having a ratchet wheel, engaged by a pawl. By means of the worm and the pawl and ratchet mechanism, the cutting wheel is constantly held up to its work. Owing to the construction of the arms carrying the cutting wheel, the wheel is adapted to cut a groove in the body of the coal equal in depth to nearly its own diameter.



TAYLOR'S COAL MINING MACHINE.

Seed Growth Promoted by Electricity.

Dr. James Leicester, of the Merchant Venturers' Technical School, Bristol, has been studying the growth of seeds in what may be described as electrified earth. The *Chemical News* says: A box about 3 ft. long and 2½ ft. wide was filled with soil, and near each end two metal plates, one of zinc, the other of copper, each about one square foot in size, were immersed, and were united outside by a copper wire. It is evident that by slow chemical action on the zinc a current will pass through the earth toward the copper, and returning by the outside copper wire will form about the simplest of simple cells. Various seeds were sown in the earth between the plates, and in every case it was found that the seeds grew much quicker than they did when the plates were absent. Similar and even more definite experiments were made with glass tanks, some with and some without the metal plates. All of them were filled with the same earth, and were treated with the same quantities of water. In one typical instance the result is thus stated: "In the case of hemp seed, it was fully an inch above the surface before there was any sign of it in the ordinary vessels." The experiments were varied in several ways, but always with substantially identical results. It was found that if the soil was watered with a little very dilute acetic acid, the growth of the seeds was much quicker when the metal plates were present, whereas without them no difference was noticed.

IF you take a good conductor like copper, and run the temperature down, its resistance almost disappears at very low temperatures; hundreds of degrees below zero copper is almost a perfect conductor. If you heat it up, it becomes more and more resisting. Let us take glass—a good insulator—or any insulating material, and run its temperature up, it loses its insulating power, and if we run it up until it gets to red heat, it approaches a conductor; so that all substances are conductors when they are hot enough.—*Prof. Thompson.*