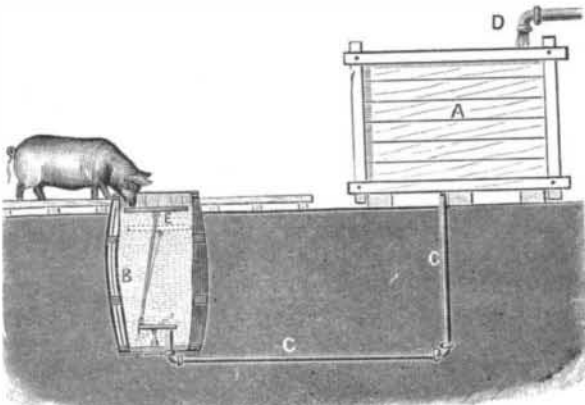


**NOVEL DEVICE FOR WATERING ANIMALS.**

The device shown in the annexed cut furnishes a constant supply of clean water and prevents waste, and is therefore well adapted for watering animals, and especially hogs. A barrel, B, is sunk into the ground, and is connected with a tank, A, or a pond or water main, by a subterranean pipe, C, which projects a few inches into the bottom of the barrel. A pivoted gate or valve rests upon the end of this pipe, and the other end of the valve is connected with a float, E, which is so arranged that when the barrel is filled the end of the pipe, C, is closed by the action of the float; but as the animal begins to drink the level of the water in the bar-



**DEVICE FOR WATERING ANIMALS.**

rel decreases, the float, E, falls with the water, and opens the valve at the end of the pipe, C, admitting fresh water from the tank until the barrel is again filled.

**STEAM TUGBOAT EXPLOSION.**

BY S. N. HARTWELL.

The sketches which I herewith submit are intended to illustrate the accident, if a blow-out may be so designated, that happened to the boiler of the steam tug Jacob Brandow, in the lower bay of New York, on the 2d of June. The perspective sketch (Fig. 1) represents the boiler lying on its side, which position has no reference to the effect of the blow-out, but it is so placed for the purpose of showing the location of the rupture and its relation to adjacent parts of the boiler. It will be seen that the boiler is of the double furnace tugboat type, a variation of the fire-box form common in the towing practice of this city and vicinity. Its principal dimensions are: Diameter, 7 feet; length, 15 feet; dome, 4 feet diameter by 5 feet high. Two furnaces, each 34½ by 72 inches horizontal measurement; height above grates, about 30 inches. There are 10 flues, 5 to each furnace, through which the gases pass directly forward to the smoke connection, whence they return by 75 tubes to the up-take (or front connection) and chimney. The flues first mentioned are to each furnace: one 12 inches, three 8 inches, and one 7 inches diameter. The boiler was made of five-sixteenth iron plates, by a reputable city manufacturer, in 1867, since when, about seventeen months ago, it was fitted with new furnace sides and put in thorough repair. The workmanship and material appear to be the best. No stamp indicating the tensile quality of the iron was observed, however, upon the plates. The steam pressure allowed by the government certificate is 65 pounds by the gauge; and there was one common lever safety valve, by which steam was supposed to escape when the limit of pressure was reached.

About 6:30 P.M. on the 2d of June, while steaming at the usual working pressure—something less than 65 lb.—a piece of one of the new sides blew out, apparently starting at the point *a* Figs. 1 and 2, where the iron is now but about half its original thickness, namely 0.155 (originally 0.312). The sketch, Fig. 2, gives an idea of its proportion and present shape. At other points, as *b* and *c*, the thickness is respectively 0.185 and 0.165 inch. On the side, *e*, at the margin of the piece, is observed the peculiar defect called *star corrosion*, indicated by radiating lines at the stay holes. This condition is often found on the water side of stayed flat surfaces that have been subjected to a sufficient pressure to puff the plates between the stays, giving it the appearance (in less degree) of a mattress. This has the effect of opening the texture of the plate around the stay hole, which goes and comes as the pressure falls and rises; radial lines of corrosion are formed, deepening and widening toward the hole with each successive motion, till leaks and finally ruptures occur. When there is a considerable area of overloaded plate stayed insufficiently, one stay head pulls through, and the rest, being overpowered by a sudden accession of load, give way successively, and a sufficient body of water escapes, the reaction and expansion of which produces the phenomenon known as an explosion. In this case, however, the *star corrosion* may be considered as an indication rather than a cause of the weakness, for appear-

ances indicate that the initial rupture was along the other margin of this piece, along the lap of the seam where a continuous groove had resulted from corrosion on the fire side of the plate, and having progressed faster, probably from unobserved leaks, gave way first. The sketch, Fig. 3, shows the construction of the parts on a larger scale. The leak that caused the corrosion of the fire side of the plate was probably only a sweating leak, which is the most dangerous because it is most likely to escape observation. If this had been a case of a dripping leak probably the surface below the seam would have suffered most, and perhaps have given way instead of that above the seam.

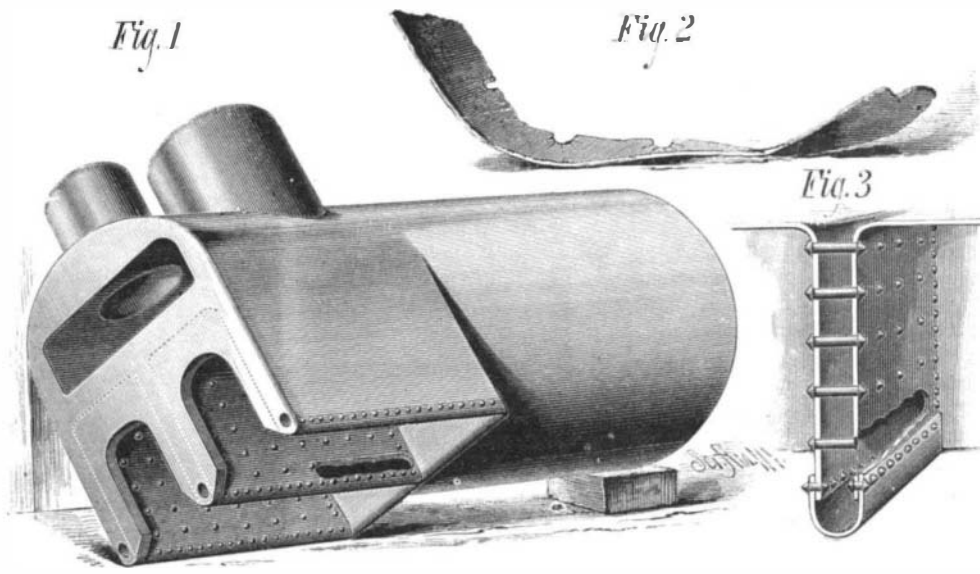
The effect of this blow-out was an opening of about half a square foot of area, through which the water was forced with terrific power, beginning at a theoretical velocity of about 100 feet per second and ending at something like half that, supposing that none of the free steam escaped from the steam room through the intervening water. Sixty cubic feet of water would thus escape in about two or three seconds, allowing for obstructions in the furnace, and everything movable would be driven before it, as was the case. The engineer, who was supposed to be in the fire room, made his way to the deck probably nearly dead, and was lost overboard. The fireman, his son, who was on the top of the boiler, in the act of shutting off the steam jet, was badly injured. The fire upon the starboard grates and coals in the fire room were blown against the woodwork abaft the engine and against the engine itself with a force sufficient to abrade the whitewash and paint with which these parts were ornamented. Government certificates and officers' licenses, that were duly posted according to law, were sadly defaced, but no serious damage was done to the boat, as would most likely have happened if the weak area had been of sufficient extent to have allowed of the instantaneous escape of the boiler contents.

The government certificate of inspection, which is the form approved February 11, 1880, expires on the 30th of July, 1881, indicating that about ten months had elapsed since the boiler was inspected. It shows, also, that the hull was built of wood in 1864, and that the boiler, rebuilt in 1880, was built in 1867, as stated above. Other memoranda in the certificate, are: one safety valve, one steam gauge, one low water gauge, one fusible plug, and three gauge cocks. The certificate was signed by Austin Joyce, Inspector of Hulls, and John K. Mathews, Inspector of Boilers.

Mr. William Tebo, the polite owner of the Brandow and a number of tugs beside her, offered every facility to the writer for obtaining the sketches and other memoranda embodied in this report, and being himself a practical engineer, indicated, by his personal attentions and sentiments expressed, a desire to inform his fellow engineers, through the press, just how it happened. A thorough reinspection is to take place in a few days, when he will promptly and cheerfully do to the boat just what the government inspectors direct.

**The American Institute's Semi-Centennial.**

This year's fair of the American Institute, of the City of New York, will be the fiftieth of these useful exhibitions. The desire of the directors is to celebrate the occasion by an exceptionally full presentation of novel inventions, machin-



**BOILER EXPLOSION.**

ery, and industrial products. Their announcement of the "Semi-Centennial," on another page, we commend to the attention and co-operation of our inventors and manufacturers.

**Telegraph Cables in Sewers.**

An important experiment looking to the disuse of telegraph poles in cities is being made in Washington, D. C., by the Mutual Union Telegraph Company. Having received permission to run their wires through the common sewers of the city the company began the work of placing the wires June 6. The wires which are needed for the city service and for connection with lines outside the city are twisted cable form and covered with a non-conductor and waterproof coating. Outside the city limits these wires

emerge from the sewers and join those placed upon poles. The cable made of the twisted wires is attached firmly to the arched roof or top of the sewer, and thus raised above all interference from water, except in case of floods. The cables are laid by men enveloped in rubber clothing and provided with safety lanterns, provision being made for conducting fresh air to the workmen by means of India-rubber tubes attached to their rubber suits. The wires are passed down through the man holes of the sewers.

**VELOCIPED CARRIAGE.**

The engraving shows a light and compact velocipede car-



**VELOCIPED CARRIAGE.**

riage of German invention, calculated for easy and comfortable riding and capable of carrying light baggage. The rider sits in an easy chair above the forward axle, and grasps the guiding handles attached to this axle. The feet rest upon pedals connected by rods with cranks on the rear axle. By the alternate movement of the pedals the carriage is propelled. A lantern is carried in front, and a canopy covers the head of the rider.

**NEW INVENTIONS.**

Mr. George W. Mason, of Sharon, Pa., has patented a composition of matter to be used for making artificial stone, and consisting of pitch made from gas-tar, cement, plaster of Paris, lime, ground cinders, ground ore, ground oyster shells, fine ashes, pulverized dry clay, dry sawdust, ground slate, ground stone, sand and pebbles, and molten brimstone.

An improved harvester guard finger has been patented by Mr. Elisha S. Snyder, of Snyder's Mills, West Va. The invention consists in a sectional guard finger constructed with two reversible plates, each having two cutting edges, the plates being arranged to engage with the sickle knives, and held in position by a removable top section provided with beveled edges, which may be utilized by inserting a sickle having inverted knives.

Mr. Charles A. Pennington, of Champaign, Ill., has patented an improvement in field corn huskers which consists in the peculiar construction of the revolving husking rolls, between which the cornstalks are forced and the ears husked, and in a revolving recessed wheel for feeding the stalks carrying the ears between the husking rolls. The machine is provided with a fender and guard for the stalks, for the purpose of holding and guiding them while the corn is being husked.

Mr. James H. Palm, of Lexington, O., has patented an improved device for raising and lowering the front end of a clevis pivoted to the forward end of a plow beam, whereby the plow can be made to plow deeper or shallower; it consists of a clevis having its opposite arms pivoted to a plow beam on each side near its forward end, and provided with a cross rod, to which a slotted tongue carrying a pin is hinged, the pin on the tongue engaging in a cam groove in a wheel provided with a crank shaft extending back parallel with the beam.

An improvement in shovel plow blades has been patented by Mr. Henry A. Ridley, of Newport, Ark. The object of this invention is to facilitate the enlargement and contraction of shovel-plow blades, as the character of the work to be done may require, and also to facilitate repairing the blades.

Mr. Jacob G. Walton, of Davilla, Texas, has patented an improved cotton planter having a vibrating agitator which is used in combination with a hopper.

THE tower clock of the First Presbyterian Church, Newark, N. J., lately stopped. The town time-keeper found in the wheels of the clock a tangled mass of hay, twine, grass, cotton, and feathers, amounting to nearly half a peck. A pair of birds had entered the tower through a hole in the dial and attempted to build a nest in the machinery of the clock. The slow revolution of the wheels tore their work to pieces, and they kept on reconstructing it until they stopped the wheels.