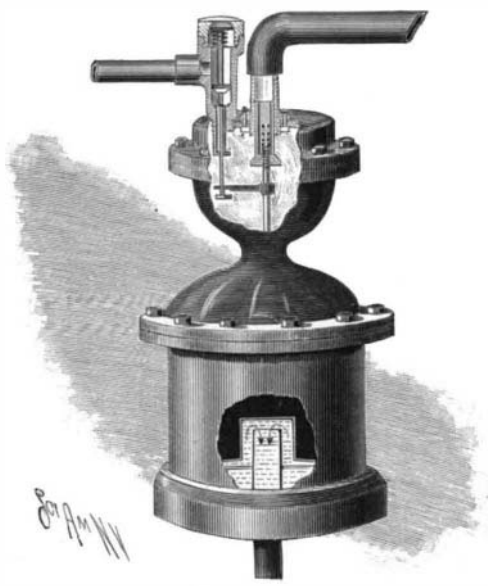
A CONDENSER FOR STEAM ENGINES.

The illustration represents a condenser arranged to prevent the water from accumulating in the condenser casing, irrespective of the working of the pump, and without causing back pressure on the engine. It has been patented by William T. Snell, Laurium, Mich. It has a closed casing from whose bottom extends a suc-



SNELL'S CONDENSER FOR STEAM ENGINES.

tion pipe connected with a pump, and in the casing is a bell-shaped float on whose upper end is a vertical stem connected with a spraying nozzle sliding in a pipe leading to the water supply, the rise and fall of the float thus shutting off or regulating the admission of the cooling water. On the upper end of the condenser is also a valve casing connected with the exhaust pipe of the engine, the casing having two valves attached to a common valve stem, whose vertical movement causes the steam to be passed into the condenser or to the outer air. A coiled spring near the upper end of the valve stem holds it normally in uppermost position, the steam then passing into the condenser; and on the lower end of the stem, within the condenser casing, is a collar adapted to be engaged by an arm which is vertically adjustable on the stem extending upward from the float. In case the water accumulates in the casing, from not being drawn off fast enough by the pump, the rising of the float shuts off the supply of cooling water, which is again admitted through the spraying nozzle, when the pump reduces the amount of water and the float moves downward. Should the water supply fail, or water be drawn from the casing faster than supplied, the sinking of the float would cause the arm extended from the stem of the float to engage the collar on the lower end of the valve stem in the casing connected with the exhaust steam pipe, thereby shutting off steam from the condenser and passing it out to the atmosphere. In the under side of the float, as shown in the broken-away portion in the engraving, is a small chamber into which extends the upper end of the suction pipe, permitting air bubbles to be readily drawn out, a spider on the bottom of the float forming a guide for the float on the fixed suction pipe.

TWO NEW RANGE FINDERS.

We illustrate herewith two range finders, invented by George M. Searle and George N. Saegmuller, of

SEARLE AND SAEGMULLER'S RANGE FINDER.—Fig. 1.

Washington, D. C., for which United States letters patent Nos. 588,093 and 588,094 were granted them August 10, 1897. The purpose of these devices is to determine the distance of remote objects, such as an enemy's vessel at sea, in a rapid and convenient manner, by means of a scale on the instrument, and without the delay of calculation.

Fig. 1 is designed for use on the deck of a ship, or other horizontal surface, and its base line is horizontal; its principle of operation being that of a constant angle by means of an adjustable base line. It comprises a graduated base line bar having a fixed right angular reflecting prism at one end, and also a movable one, with a pointer, traveling on the graduated scale of the base line bar, said two reflecting prisms being in different planes to throw their images on different portions of the object glass of a telescope, and a telescope constructed to bring these two images into coincidence whenever the movable reflecting prism reaches the point on the scale indicating the distance of the object viewed.

Fig. 2 is designed to meet the conditions of range finding or distance measuring from an observation point aloft, on the mast head of a ship, for instance. The base line in this case is vertical, and is of a fixed and definite length. This range finder comprises a telescope, two reflecting prisms separated, in fixed relation, a distance apart representing a base line, and arranged in different planes, so that each sends its own rays upon a different portion of the object glass of the telescope; an axially adjustable refracting plate for receiving the rays from one of the reflecting prisms and bringing them into coincidence with the other rays of the other prism; a pointer fixed upon the adjustable refracting plate; and a cotangent scale of equal parts for marking equal spaces for variable distances. This latter device (Fig. 2) is being put upon the United States battleship Iowa, and great results are expected from it. From a preliminary test the following comparison of distances by triangulation and the range finder were obtained.

Fig. 2.
RANGE FINDER.

By Triangulation.	By Range Finder.
2154 yards	2140 yards
1814 "	1800 "
1212 "	1220 "
1184 "	1190 "
4300 "	4270 "

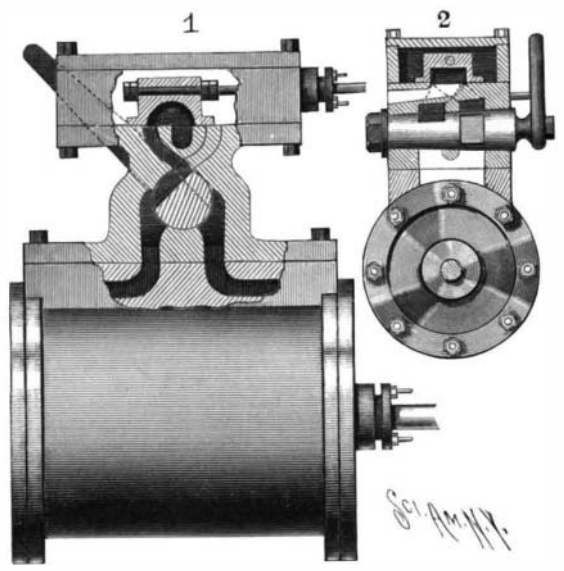
The instruments are being manufactured by George N. Saegmuller (Fauth & Company) Mathematical Instrument Works, No. 108 Second Street, S. W., Washington, D. C.

Time for Surgical Operations.

In regard to the best time for capital operations, a writer in Gaillard's Journal states that in following the course of such cases and of various operators for a number of years in the hospitals of a large city, it seemed that the early morning hour presented many advantages—that is, a good night's rest, attained artificially if necessary, an empty stomach, the patient all ready for anæsthesia upon awakening, the fear and dread of what is coming being crowded into the fewest possible moments, the whole day with active attendants constantly moving about and alive to every demand of the patient, etc., are a few of the points which seem to recommend an early hour; on the other hand, it is not to be denied that it may be a source of greater task upon the surgeon's powers, especially if he be concerned and anxious, as conscientious men always must be in regard to capital operations, and if this anxiety interferes with the operator's sleep. Even with this disadvantage, however, the operator is capable of doing really better work before he has become tired and annoyed by the various demands upon him during the early hours of the day. Consequently, those who have operated extensively in the early morning hours never volunteer any afternoon operations.

A REVERSING VALVE FOR ENGINES.

A reversing valve chest is, according to the improvement represented in the accompanying illustration, interposed between the ordinary cylinder and steam chest, and this valve chest contains a reversing valve and connecting ports, the device being readily applicable to any ordinary engine, although for new engines the reversing valve chest may be made integral with the cylinder or the steam chest. The improvement has been patented by David W. Roy, of Tucson, Arizona Territory, Fig. 1 representing it in side elevation and Fig. 2 in transverse section. The port at one end of the cylinder connects with two ports in the reversing valve chest, containing a reversing valve in the form of a plug valve, and the port at the other end of the cylinder connects with two other ports in the chest, and leading to the bore in which the valve is mounted to turn, the several ports of the valve being arranged opposite each other, but in pairs which lie in a different vertical plane, and each pair connecting by different passages with ports leading to the steam chest, where the slide valve is operated from the main driving shaft of the engine in the usual manner. Between the ports leading to the steam chest is an exhaust port, and on the outer end of the plug valve is a handle by which the valve may be turned to the right or left for revers-



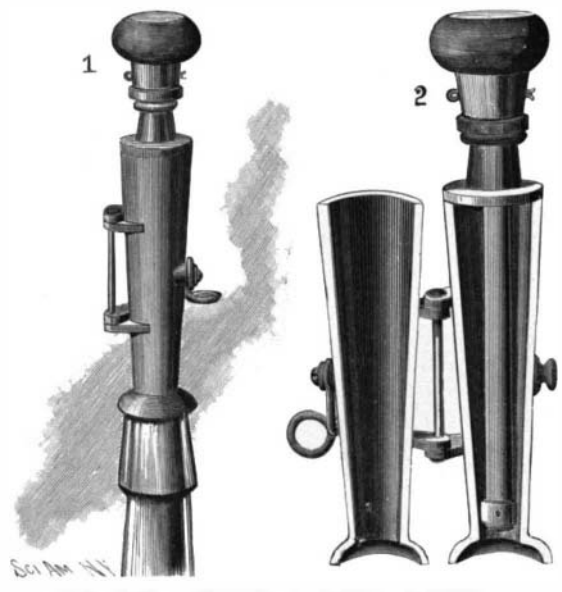
ROY'S REVERSING VALVE FOR ENGINES.

ing the engine, or moved to a vertical position for cutting off steam.

H. WILDE has exceeded his own estimated limit of 400 lb. per square inch for magnetic traction by means of annealed charcoal iron wire 0·57 in. in diameter. The electromagnet was excited by a current of 40 amperes. With a piece of wire 1·2 in. long the unprecedented tractive force of 422 lb. per square inch was obtained. That the magnetization limit was virtually arrived at was shown from the fact that, when the current transmitted round the electromagnet was reduced from 40 to 26 amperes, the amount of the tractive force remained constant. The determinations were made with a single pole electromagnet, says the Electrician.

INSERTING CORKS IN BOTTLES.

For driving corks into place in bottles, as may be necessary in small bottling establishments or where families preserve domestic products, the device shown in the accompanying illustration has been invented and patented by Charles von der Linden, of Rhinebeck, N. Y. Fig. 1 shows the device closed, applied to a bottle, and Fig. 2 shows it open. It has two tapering sections, pivoted to swing to open and closed position, the sections being held closed by a clamping arm, and the lower end of each section has a semicircular flange, the flanges forming a dish-shaped cavity adapted to receive the mouth of the bottle. A circular head closes the upper ends of the sections, and in an upwardly extending boss is held a sliding rod or plunger, to the upper end of which a hand knob is removably attached by a cotter pin. A washer of greater or less thickness is placed on the plunger below the hand knob, thus regulating the amount of vertical movement of the plunger. In use, the cork is placed in the open lower end of the device, when the sections are closed to hold the cork firmly, and the flanges are made to embrace the mouth



VON DER LINDEN'S CORKING DEVICE.

of the bottle, after which the hand knob is struck to drive down the plunger rod and force the cork into the neck of the bottle. To drive the cork completely down, flush with the mouth of the bottle, the washer is removed from the plunger rod.

The Grand Central Station.

This great headquarters and metropolitan station of the New York Central and Hudson River system is now being enlarged and changed as to its exterior in a most radical way, although the interior arrangement of the ground floor is not to be changed at present. The original building, not counting the more recently added train-receiving house, was 240 feet on Forty-second Street by 692 feet on Vanderbilt Avenue, built of brick, stone and iron, and costing nearly $2,250,000. On the streets named it was three stories high and was surmounted by several Louvre domes, and three more stories are now to be added, giving a uniform height of six stories, the towers also to be carried up proportionately, except the clock tower, which is to be obliterated. The entire building will be faced with stucco work, giving it the appearance of Indiana limestone, and the improvement will cost in the neighborhood of $700,000. The added room thus provided has long been needed for the use of the executive officers and the 500 to 600 clerks employed. It may be added that at the same time that this very considerable work is being carried on, employing a large force of men, the neighboring streets are also being occupied by the workmen and materials necessary in constructing the new underground trolley, by which many of our leading street railways are to be operated by electricity.

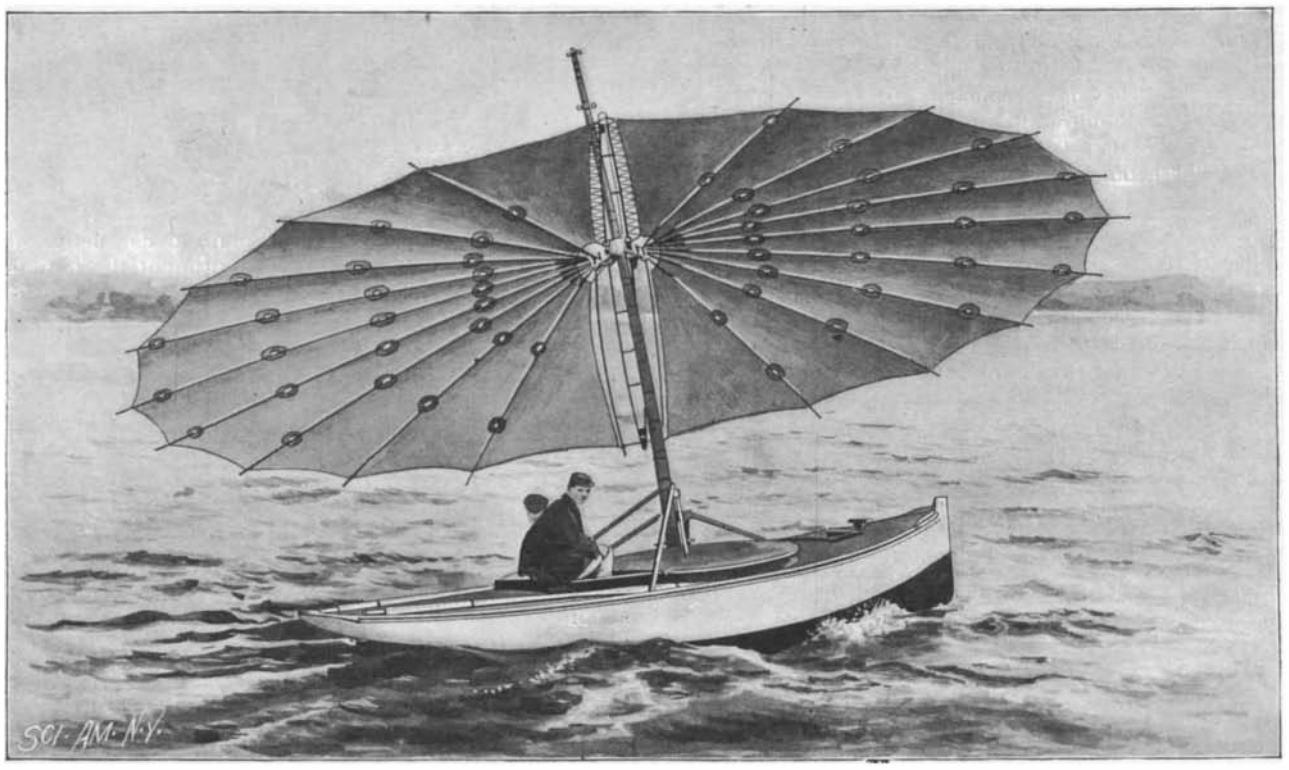
THE UMBRELLA BOAT.

The queer sailing vessel shown in our engraving is called the "umbrella boat," and is also known as the boat with the cyclone sail. This boat has been very conspicuous at Cowes and in the Solent. Our engraving was made from a photograph by West & Sons, Southsea, Eng. The chief feature of the cyclone sail is, it is said, that "the wind pressure does not tend to incline the boat. When the wind is making a large angle with the sail the center of pressure is almost at the center of the surface, but when the wind strikes the sail at an acute angle, as in all sails or kites, the center of pressure moves toward the weather edge; but, by suitably adjusting the sail, the desirable result of obliterating all heeling movement has been achieved.

"In practice this has been obtained by putting more sail to leeward than to windward of the mast and also by placing the sail not quite at right angles to the mast, but more raised on the lee side. The sail is made oval, with the major axis horizontal, so as to be able to carry more sail with a definite height of mast.

"The training in a horizontal direction is accomplished by means of a turntable, and the elevating and lowering by two tackles. There is a balance weight which helps in elevating the mast and which is just sufficient to balance the dead weight of sail in a calm not inclining the boat. The sail can be set and furled in a minute; it does not close like an umbrella, but each side shuts up like a fan. The object of the sail is to be able to sail without inclining the boat, so that the limit of driving force is not governed by the stability of the boat in any way, and also that the boat sailing on an even keel has less resistance than when sailing with a list."

In addition to the inventor's claim for his boat, the following particulars may be of interest: The sail in the illustration measures 30 feet horizontally and 16 feet up and down, while the total length of the boat is only 17 feet on the water line. With an ordinary rig 200 square feet of canvas was found too much for this boat, but with the umbrella sail she carries 360 feet of canvas and sails much faster. A light boat especially adapted for the sail is now being built by Messrs. Thornycroft, of Chiswick, England, the well-known manufacturers of torpedo boats.



THE UMBRELLA BOAT.

Shrinkage of Castings of Metals.

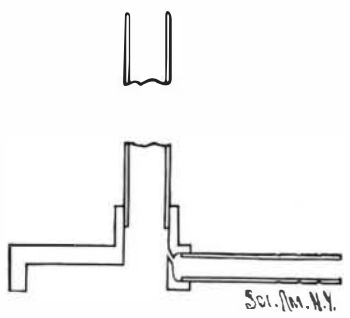
Pure aluminum (13-64 inch)	0·2031	inch to the foot.
Nickel aluminum casting alloy (3-16 inch)	0·1875	" "
Special casting alloy of the Pittsburg Reduction Company (11-64 inch)	0·1718	" "
Thin brass castings	0·167	" "
Tluck " "	0·150	" "
Zinc	0·3125	" "
Lead	0·3125	" "
Copper	0·1875	" "

—Aluminum World.

AN IMPROVED FORM OF BUNSEN BURNER.

A great drawback with the ordinary form of Bunsen burner is the liability of the central jet to become choked up by anything falling down the tube, says Hugh Marshall, D.Sc., F.R.S.E., in the Journal of the Society of Chemical Industry. A single drop of water is often sufficient to extinguish the flame, and a fused borax bead is still more objectionable, owing to the difficulty of properly clearing the jet. This is troublesome enough in ordinary laboratory work, but is much worse with a large practical class. Various methods of getting over the difficulty have been tried more or less successfully. I think, however, I have now succeeded in evolving a form of burner which is a considerable improvement on preceding ones.

The improvement consists in replacing the central



jet by a suitably inclined lateral opening in the wall of the burner itself. The burner is left open right through, and the side air holes are done away with. An air regulator can be fitted on the base in the form of a pivoted diaphragm. A simple form of the burner is illustrated in the diagram. This represents a section through the gas supply tube and inlet (to the right of drawing) and one limb of the tripod base (to the left). The upper tube screws into the lower portion. This consists of a very shallow tripod with circular opening for the tube. At one side of the opening is a block into which the gas supply tube is fixed and through which the gas inlet is drilled. The inclination of the inlet and its diameter depend somewhat on the richness of the gas used.

The advantages of the burner are that the gas inlet does not become choked; anything dropping down the tube passes right through to the bench. Further, if the gas inlet is properly arranged, the flame can be turned down very low without its striking back or the air supply requiring regulation. Again, the air regulator fitted on the bottom cannot jam in the way the usual circular regulator does; in fact, it can be completely removed by the aid of a screwdriver in a few seconds; it is unnecessary except when a luminous flame is desired.

The burner is now in use in Edinburgh and Aberdeen Universities, and works well.

ALTHOUGH there is always a fascination attaching to the invention of a device affecting what might be called the conspicuous and larger needs of mankind, it is probably the improvements on the common articles of daily use that have proved the most profitable to the inventor. As an instance, our attention has lately been drawn to a case of this character, where a device known as the Johnson anti-rattler for thill couplings realized a sale of 1,700 gross in the past six months in the United States alone, and there was an excellent foreign trade, which indicates that Americans are not alone in appreciating improvements of the smaller kind.

Pennock's Electric Power Transmission Plan.

George B. Pennock, a New York electrical engineer, says he has invented a system of electrical distribution which will revolutionize the present methods of railway transportation. His claim is that he can so distribute electrical energy by means of a new kind of third-rail system that a hundred trains can be moved at a cost no greater than is now necessary to move one train, and that he has practically demonstrated the value of his discovery in electric lighting by supplying sixty standard candle power incandescent lamps with one horse power. The inventor was formerly a train dispatcher on the Pennsylvania Railroad, but for many years has given his entire time to electrical subjects. In an interview published in the New York Sun he says:

"In moving cars by electricity we generate at a central point a certain amount of horse power in the shape of electricity. That must be sent out over the route on which the cars run, and there must be as many times the power required to move one car as there are cars. To achieve the results which I claim will come from my system—that is, not to need a power increased in proportion to the number of cars used—I would build a central station midway between the terminals of the line, and in this I would put a 1,000 horse power engine and a 500 horse power dynamo. That is all that would be necessary to move any number of trains. Then I would put up my voltage distributer, which brings about the required result. This is a circular track cut up into 100 segments each 10 inches long. Mounted on it is an electric motor car of one-half horse power designed to run at a very high speed, to complete the circuit of the track 400 times in a minute. It is locked in by two tracks above, one of which carries the current to run the motor, and the other the current from the 500 horse power dynamo to the distributer.

"Between the rails of the railroad tracks, along their whole length, is placed a series of conducting segments, a brass rail one inch in diameter, each segment 500 feet long, the segments separated from each other by a space of three inches. Running side by side with these segments will be a similar but continuous conductor to complete the circuit. Each of the segments in the distributer is connected with wires to a 500 foot segment between the tracks. When all is ready the motor car on the distributer is set in motion, and, as it flies around the circle at the rate of 400 times a minute, it successively closes the circuit between the small segments in the distributer and the large segments between the tracks, and conveys to each segment sufficient electricity to start a train. This current is taken up from the large segment into another but smaller voltage distributer on the train, in charge of the motorman. This consists of ten segments, each attached to a motor on the train. The force of the current is 100 volts. The motorman has charge of this, and by turning his switch can use one motor with 100 volts or ten with a thousand. The current will be taken from the segments on the track to the voltage distributer on the trains by means of a connection underneath the car similar to a trolley pole. One of these trolley wheels or shoes will rest continuously on the continuous rail, so that by generating 500 horse power at the dynamos, distributing it to the segments and putting just enough in each one to start the cars, I can do all the work of the road with 500 horse power. In other words, the same power is intermittently transmitted from one train to another several hundred times a minute. When the cars are started they move on to the next segment, where a new contact is made, thus giving fresh impetus. Finally, I have invented an automatic negative pole stepback to use in connection with the motors on the cars that will multiply the current ten times. [The Editor of the SCIENTIFIC AMERICAN assumes no responsibility whatever for this newspaper story.]