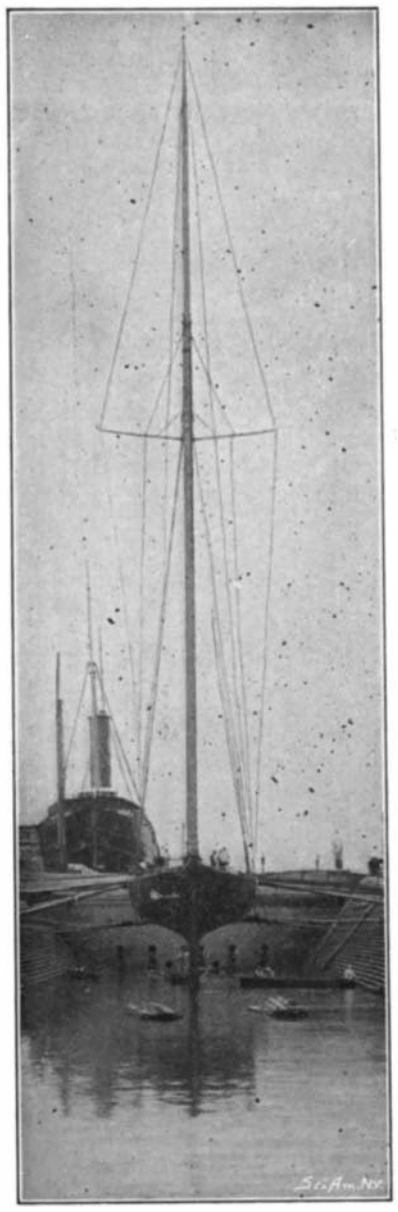
try still continues disturbed, rendering retail trade impossible, with the result that all importers have large stocks on hand. Exports are suffering from the continuance of warlike operations. Owing to the insecurity of life in many sugar-producing districts, owners of properties have not in many instances been able to visit their estates and, therefore, plant crops, the consequence being that in this and the Visayas districts the arrivals of sugar are trifling compared with those of past years."

THE ELEVENTH CHALLENGER FOR THE AMERICA CUP—"SHAMROCK II."

When the under-water form of "Shamrock II." was laid bare in the Erie drydock, two facts were at once made evident: First, that G. L. Watson has designed an entirely original boat; second, that the much-talked-of towing experiment in the Denny testing tank were evidently responsible for the most striking departures in her lines from what might be called the orthodox form of a 90-foot racing cutter. It may further be stated, without much fear of contradiction, that with the exception of a certain fullness in the sections from about the wake of the mast forward for several feet into the overhang, she has the most refined form ever seen in a Cup challenger, not even excluding that beautiful creation of the Herreshoffs, "Columbia." Her afterbody, from the point of greatest beam, which lies not very far aft of the shrouds, to her narrow and shallow stem, has been refined to a degree which makes one ask how it can ever be possible for the boat to carry her great spread of 14,500 square feet of canvas; particularly as the peak of her club-topsail will be 175 feet above the waterline. Yet, carry it she does, and shows a stiffness, moreover, that is greater, if anything, than that of her predecessor "Shamrock I."

The accompanying end-on view of the yacht, which was taken from a point about 300 feet distant, and slightly below the level of her water-line, conveys a closely approximate idea of her midship section. It will be seen that Watson has returned somewhat to the midsection which distinguished his two most successful boats, "Queen Mab" and "Britannia." There is not the slightest suggestion of the high bilges of the scow form, as seen in "Independence," nor is there the compartive hardening of the bilges, as seen in "Columbia," and even more markedly in the Herreshoff 70-footers of last season. So easy, indeed, are the bilges that we have to go back to "Defender" to find their like, and they round into the broad sweep of the freeboard curve at the fin with a true reverse curve, without so much as a suggestion of a straight line in the floor. These features, taken with the rather full and round sections toward the bow, the finely-drawn-out run and quarters, and the easy curve and great length of the diagonals, point toward a form that will be easy to drive at the higher speeds, and will show but little of that wave-making tendency which was a marked fault in "Valkyrie III." and "Shamrock I." The model is distinctly original, and, as we have said, bears upon it the mark of the towing-tank. We venture to say that the model of the boat will commend itself at the very first glance to any naval constructor who may chance to see the "Shamrock" in drydock.

While the body of the boat would suggest great speed in fresh winds, particularly in running and reaching, we think that she will not prove to be relatively so speedy in light airs. It is surprising to find that the lateral plane shows an area of fin that is at least as large as that of "Shamrock I." Watson and Fife are reported to have collaborated in the production of this yacht, and so striking is the likeness in depth and length of fin, and in shape of bulb, that one could almost believe, were it not for the utter dissimilarity of the body above, that one was looking once more at "Shamrock I." In view of the splendid weatherly qualities of "Columbia," whose keel is several feet shorter, one would have expected Watson to have reduced his lateral plane, and so saved some 80 to 90 square feet of wetted surface. Of course, a long keel means a low center of gravity of the lead, with a proportionate increase in sail-carrying power; and the good results are seen in the ease with which "Shamrock II." carries her club-topsail in a fresh breeze. In lighter winds area of wetted surface becomes a factor of greater importance than ease of form, and in winds of 8 knots' strength and less we look for "Shamrock II." to show to less advantage. The dimensions of the hull are: Length on deck, 137 feet; beam, 24 feet; draught, 21 feet 3 inches.



End-on View of Shamrock II. Showing Midship Section and Lofty Rig.

The sail-plan of the new challenger is relatively narrow in proportion to its height. The steel pole mast of the "Shamrock" measures 158 feet, 8 inches over all, and buries 8 feet 8 inches in the hull, thus making the height from deck to truck 150 feet. As the club-topsail extends 20 feet above the truck the peak of that sail will be 175 feet above the water-line; and if the yacht were ranged alongside the Brooklyn Bridge its club-topsail would extend 40 feet above the roadway! Compared with its height the sail-plan will have a comparatively narrow base, the boom being exactly 102 feet 9 inches long, and the bowsprit 30 feet outboard.

Compared with "Shamrock I." the new yacht has a foot less beam, a few inches less draught, less displacement, less wetted surface, and over 10 per cent more sail area. She is also lighter in construction. In her earlier trials against the older boat she failed to show any marked superiority; but in her later trials she seems to have "found herself," and has beaten the Fife cutter under any conditions of wind and sea.

A NEW LUMINOUS FOUNTAIN.

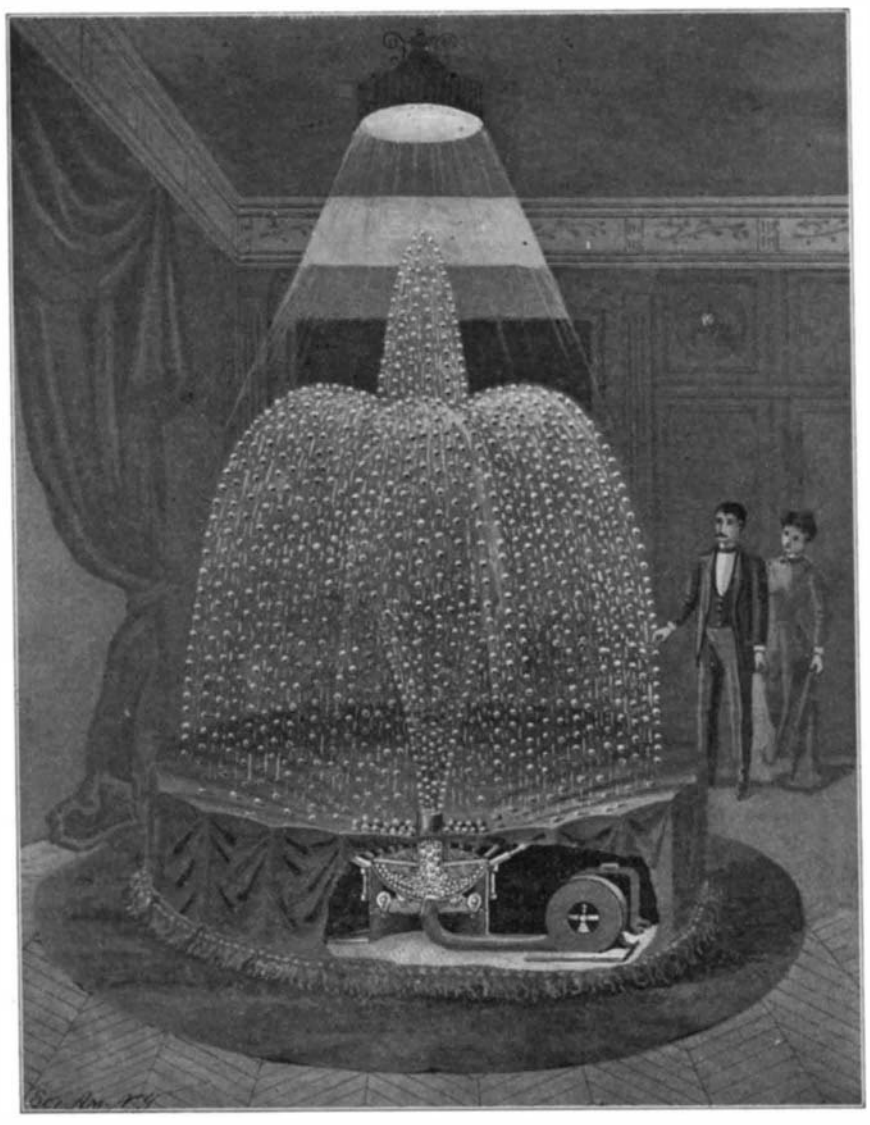
A recent number of the Transactions of the French Academy of Sciences describes a very ingenious luminous fountain which owes its invention to Gustave Trouvé. Luminous fountains have been not the least attractive feature at every international exposition held since 1889. In a few public parks of American cities and in certain places of amusement abroad such fountains have been permanently installed. But it is safe to say that the great majority of people have never seen a luminous fountain. It is for these less fortunate ones that M. Trouvé has devised a portable apparatus which can be set up in a house and made to spurt streams of light which seem like luminous water.

In order to overcome the difficulty of installing a system of water pipes—a difficulty which has hitherto prevented the general introduction of luminous fountains—Trouvé decided to dispense with water altogether and to secure the effect of falling drops by means of grains of wheat, barley and rice and by means of small balls of colored celluloid. The rice and the celluloid proved most effective.

In its general construction the apparatus includes a sheet-metal cylinder, the raised bottom of which is provided with a number of incandescent electric lamps. Through an opening in the center of this bottom a blow-pipe extends. Within the upper portion of the cylinder a receptacle is supported communicating with the blow-pipe and resembling in form an inverted mushroom, the stem of which constitutes a chimney-like passage for the escape of the wheat grains or celluloid balls contained in the receptacle. When air is forced through the pipe the grains or balls are blown up through the hollow stem to a considerable height, only to fall back again into the receptacle.

In order to impart to the contrivance the appearance of a fountain the cylinder is provided with radiating bamboo rods, upon which a green fabric, properly draped, is hung. This artificial basin can be adjusted at any angle to the cylinder and serves the purpose of receiving the balls blown through the central stem or nozzle, so that they may roll back to the receptacle in order to be discharged again.

Light is thrown down upon the fountain by incandescent lamps mounted in a reflector secured to the ceiling. The polychrome effect produced by the beams reflected by the balls is exceedingly picturesque and decidedly illusory.



A NEW LUMINOUS FOUNTAIN.

A New Rangefinder.

A new rangefinder, invented by Prof. G. Forbes, F.R.S., was on view at the Bisley rifle meeting, says Nature. The want of a rangefinder that is portable and workable, that has not more than 2 per cent inaccuracy at 3,000 yards, and that does not require a telescope so large as to require a stand, is much felt in infantry work, especially with maxims. All these conditions, says The Times correspondent at the meeting, are met by the one in question. It consists of an aluminium base, 6 feet in length, which can be folded in the middle and strapped across the back, and a field-glass carried in the usual fashion. The base is a square tube, hinged at the middle. Each half has at each end a doubly-reflecting glass prism. The rays of light from a distant object strike the outer pair of these four prisms, are reflected at right angles along each tube, and are then reflected at the two middle prisms into the two telescopes of the binocular, which can be easily fixed to the center of the base when in use in directions parallel to the original rays intercepted by the outer prisms. By the measurement of the angle between these rays the distance of the object looked at is determined. This angle is measured by two vertical wires, one in each telescope, seen by the two eyes. One of these wires is fixed, the other moved by a micrometer screw until the two wires appear as one at the same time that the object is seen distinctly. The instrument gives the distance, in the hands of an ordinary observer, at 3,000 yards to within 60 yards, at 1,500 yards to 15 yards. The 6-foot base folds to 3 feet 3 inches, and weighs under 3 pounds.

Yellow Glass for Fixed Signals.

The use of yellow glass for the lamps of fixed signals is steadily increasing, says The Railroad Gazette. The latest installation is on the joint line of the Erie and the "Big Four," between Marion Junction and Gallion; and this example will be of particular interest because the yellow lights will be used under more trying conditions than they have been subjected to anywhere else. Doubt has been expressed on all sides whether a yellow which is dark enough to be quickly

distinguished from street and house lights would not under adverse conditions, such as a foggy atmosphere, be likely to be mistaken for red, and thus lead to confusion. It has been claimed that an engineman who should often find it difficult to decide whether or not a light was red would become careless and would put all reds and yellows in the same class; and thus would sometimes run past a stop signal, taking it for a home signal.

VULNERABILITY OF THE SUPERPOSED TURRET.

In a supplementary report of the Naval Board on Construction, of which Rear-Admiral O'Neil is president, extended reference is made to the weakness of the superposed turret looked at from the point of view of defense. The report contains a diagram of the "record practice" target made by the British cruiser "Terrible" plotted on a projection of the end-on view of the superposed turrets. There can be no question, the report says, that the placing of the 8-inch turret on top of the 13-inch turret considerably increases the danger of disablement of the 13-inch turret and also of the 8-inch turret itself. This is very conclusively shown in the following extract from a report on the protection of gun positions, wherein a comparison is made between certain foreign and our own battleships of the "Kentucky" class, by a well-informed officer of the navy. In regard to the chances of total disablement from either an internal accident or a small shell entering the port opening, he says:

"A baseball tossed into one of the ports would fall directly into the 13-inch handling room, opening into which are the 13-inch magazines, and below which are some of the 8-inch magazines. In action, at least four charges would be exposed, either in the ammunition hoists or ready to be put into them. There can therefore be no reasonable doubt that the explosion of a large or even medium caliber shell in the 13-inch turret would not only inevitably destroy the guns' crews and put the entire system out of action, but would, in all probability, explode the 13-inch and 8-inch magazines, as well as the 5-inch main magazines that are immediately adjacent to them, thus entailing the complete destruction of the vessel."

With reference to the additional danger of disablement of each turret, due to the fact of their superposition, he says:

"I have appended a sketch showing a projection of the end-on view of the superimposed turrets against a British 'record practice' target; and on the latter I have plotted the actual record made by H. M. S. 'Terrible' in 1900. * * * The target, therefore, represents the fire of the guns on one side; that is, six 6-inch guns during four minutes. * * * The 'Terrible's' record showed 104 shots and 80 hits with the 6-inch guns on the regular target (16 by 20 feet). Seventy-nine of the 80 hits would have struck one or the other of the 'Kentucky's' turrets. * * * Twenty-six and six-tenths per cent are on the 8-inch turret. As these shots would have passed over a single turret and been wasted, it is clear that the 8-inch turret, in this position, acts as a 'save all' for line shots going too high, and that consequently its chances of being hit are much greater than if it stood by itself. * * * Projecting the 'Canopus'' turret or shield against the target, it will be seen that it would have received 36 per cent of the 79 shots, or 45.5 per cent, thus illustrating the relative value of the low target."

The experience gained with the double turrets on the "Kearsarge" and "Kentucky" has been sufficient, says the report, to show that the features of the design, so far as they relate to the mechanical means of operation, are successful; but the features of the design, so far as they relate to the efficiency of the superposed turret as a weapon of offense, have not been developed by any practical tests. The guns have been fired at target practice in various ways, some defects in the gun mountings have been developed and remedied, but no serious test of the four-gun turret, to compare its efficiency with the two-gun or one-gun turret, has ever been made.

It is clear, from the line of argument adopted in the beginning of this statement, that it is perfectly practicable to make a test of the turrets of the "Kearsarge" and "Kentucky," which would determine the efficiency per gun from actual trial.

The general outline of the tests would be as follows:

A large target should be used, say 60 feet long at the bottom, 20 feet high, and 30 feet long at the top. This target should be anchored and moored with its length parallel to the course which the ship shall take. The firing should take place at ranges varying from about 2,500 to 1,500 yards, with the vessel moving from 6 to 8 knots per hour, and extend over a length of time of not less than twenty minutes. The "Kearsarge" should make the following runs over the course:

(1) Firing the starboard 13-inch gun of the forward turret.

(2) Firing both 13-inch guns of the forward turret.

(3) Firing all four guns of the forward turret.

The "Alabama" should make the following runs:

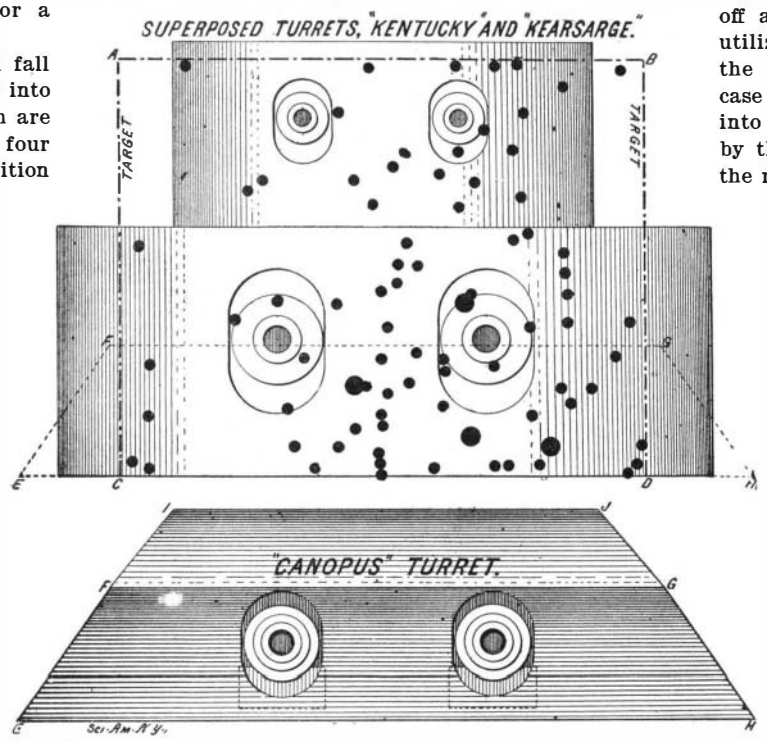
(1) Firing one 13-inch gun of the forward turret.

(2) Firing both 13-inch guns of the forward turret.

The "Brooklyn" should make runs similar to those of the "Alabama," firing the 8-inch guns of the forward turret.

NOTE.—Actual hits only to count.

These tests certainly should be made, and the results would be required to show a very high order of efficiency in powers of offense to justify the adoption of a device which has such transparent defects in defense.



A B C D, Record Target, area	320	square feet.
E F G H, "Canopus" Turret, area	122.5	" "
F I J G, Sloping Roof, area	55.5	" "
Superimposed Turrets, area	352	" "
Number 6-inch shots fired	104	
Number of hits on Record Target	80	
Number of hits on Superimposed Turrets	79	
Number of hits on 13-inch turrets—73.4 per cent	58	
Number of hits on 8-inch turret—26.6 per cent	21	
Number of hits on "Canopus" turret, front—45.4 per cent	36	

The above target represents the firing of:

Six 6-inch guns firing during	4 minutes.
Two 9.2-inch guns firing during	6 "

RECORD PRACTICE OF CRUISER "TERRIBLE," PLOTTED OVER SUPERPOSED TURRETS.

A New Weaving and Dyeing Process.

A German engineer, Otto Hallensleben, has recently invented a most interesting weaving and dyeing process, which gives promise of making a revolution in those industries. The new process practically gives a monopoly in the manufacture of carpets and rugs of the Oriental type and of similar tufted and pile fabrics. The new method has been established on a commercial scale, and for our description we are indebted to Fielden's Magazine.

In the old process, which dates from 1839, the color is placed upon the yarns after they have been wound in position, side by side upon drums. The drums are provided with a collapsible section, and on their periphery an index is marked off in spaces equal to the width of the surface of the pile or loops required in the finished fabric. One end of the frame in which the drums are mounted can be lowered or taken away from the central shaft. Beneath the drums is a tramway on which a truck or carriage is run which contains a vessel holding one of the coloring mixtures required for printing or coloring a section of the yarn, according to the design or pattern which it is intended to reproduce. When the truck passes under the drum, the pulley revolving in the color mixture impinges against the yarn and colors the portion of the surface marked off by the index. This process is repeated, the truck passing backward and forward and the drums turning so as to expose the portion to be printed in each case, while the coloring receptacles containing various colors are substituted, one for the other, until the whole surface of the yarn has been treated. Gum or starch is necessary to cause the colors to adhere, and in order to make the color penetrate the yarn and to remove the excess, the labor of two assistants is required to operate the scrapers. The excess color is entirely wasted. The collapsible drum permits of the yarn being placed on a temporary carrier and it is then conveyed to a steamer which sets the colors. It is then washed and dried and is ready for the loom. The process, while a great advance on the older ones, requires a great amount of labor and a considerable number of operators. The process is wasteful and to some degree inaccurate.

All these drawbacks are entirely removed by the new process. In general construction and action the coloring apparatus resembles a slide lathe with its compound sliding rest. The printing or coloring trucks are operated automatically, traversing the whole length of the printing bed, backward and forward without stopping, unless checked to permit the printing of the various sections of the yarns staked off in conformity with the patterns which it is intended to reproduce in the fabric. For the checking of the trucks the Jacquard apparatus is used, the needles of which are put in action by a card coming in contact with them whenever the distance allotted for their journey is completed, in stopping them after they have traveled the width of one loop, two loops, etc., as required by the design. Thus, for instance, if the design requires that a certain color shall be impinged on section number 2, of the white yarn, or section number 20 for printing the second loop, or on section number 40 for the third loop, the card will be stamped accordingly and the truck carrying the color will be checked at the places indicated, to enable the printing to be done by means of an automatic device placing a pair of jaws in contact with the portion of the yarn that is to receive the special color, and the operation is performed by one or more small color pulleys, the number varying according to the class of yarn used for the fabric in the course of manufacture, whereby an ingenious combination of mechanical devices the exact amount of color required is previously measured off so as to prevent all waste. On the other hand, the amount measured off and held between the top and bottom pulleys is utilized to the fullest extent, and not impinging on the surface of the yarn merely, as is clearly the case in the ordinary presses, but is thoroughly rubbed into the yarn by these pulleys, which are actuated by the jaws accompanying a reciprocating motion by the mechanism referred to. Section number 2 having been treated in this way, the truck recommences its journey until section number 20 is reached, when it is stopped in order that the process may be repeated, and so on until the whole yarn is colored and ready for the operation of setting the colors. Any number of colors may be applied simultaneously by employing a corresponding number of printing trucks. Without interruption the process continues by bringing into action a device which automatically transfers the multi-colored yarn on a truck, conveying it to a steam tube 9 inches in diameter, having its opening directly opposite the coloring machines; and the moment the truck is admitted the door of the tube closes, steam enters the tube and the setting operation takes place in about a quarter the customary time. The process is a continuous one, the coloring and printing operations being duplicated, so that the second quantity of yarn is prepared for printing while the first quantity is being printed and steamed. The two sections of the machine are alternately used. The washing of the yarn is also automatically performed by special mechanism.

Mr. Hallensleben's other textile invention is a loom of the type known as double-fabric loom, by which two connected pieces of pile fabric are woven simultaneously and by one operation, being separated as the weaving proceeds by severing them in the center. Its weight is over 10 tons. It is 35 feet in width by 10 feet in depth and 8 feet high. The work that is being done on it at present is the weaving of a Turkish fabric 10 feet in width. Looms of greater diameter and of the same construction can be built to manufacture fabrics 30 feet wide.

The Current Supplement.

The current SUPPLEMENT, No. 1338, is begun by an interesting article upon the "Georgia School of Technology" accompanied by 10 engravings, showing the students weaving, dyeing, etc. "Enameling at Paris" is an important technical article. "The Clarke Automatic Coaling and Weighing Barge" is accompanied by a number of engravings, showing in detail how the work is performed. "Amplification of Weather Forecasts" is by Prof. Alfred J. Henry, and is illustrated by four engravings. "The Sculptures of Santa Lucia Cozumahualpa, Guatemala, in the Hamburg Ethnological Museum," is a very interesting archæological article. "Some Recent Advances in General Geology" is an important paper. "The Mercadier Telegraph" is accompanied by many diagrams. "American Locomotives in England.—II." is published in this issue.

Contents.

(Illustrated articles are marked with an asterisk.)