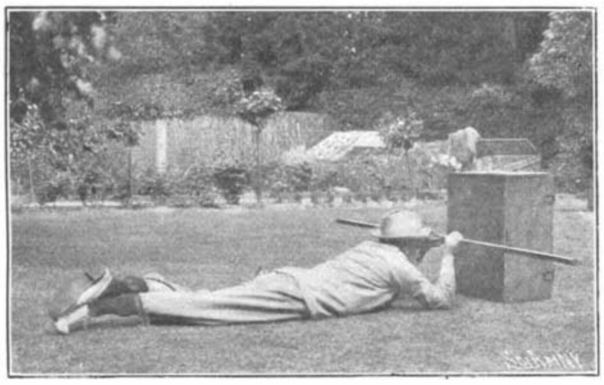
DESTRUCTION OF STEAMSHIP "PROGRESSO."

BY ENOS BROWN.

The destruction of the steamship "Progresso" at San Francisco on the morning of December 3, with a lamentable loss of life, was a catastrophe that has excited much comment, particularly in the West, where a general movement for the installation of oil in place of coal for fuel was in process of accomplishment. The "Progresso" was an iron steamship of about 3,000 tons capacity, and had been employed as a collier and government transport Six months ago she was with-

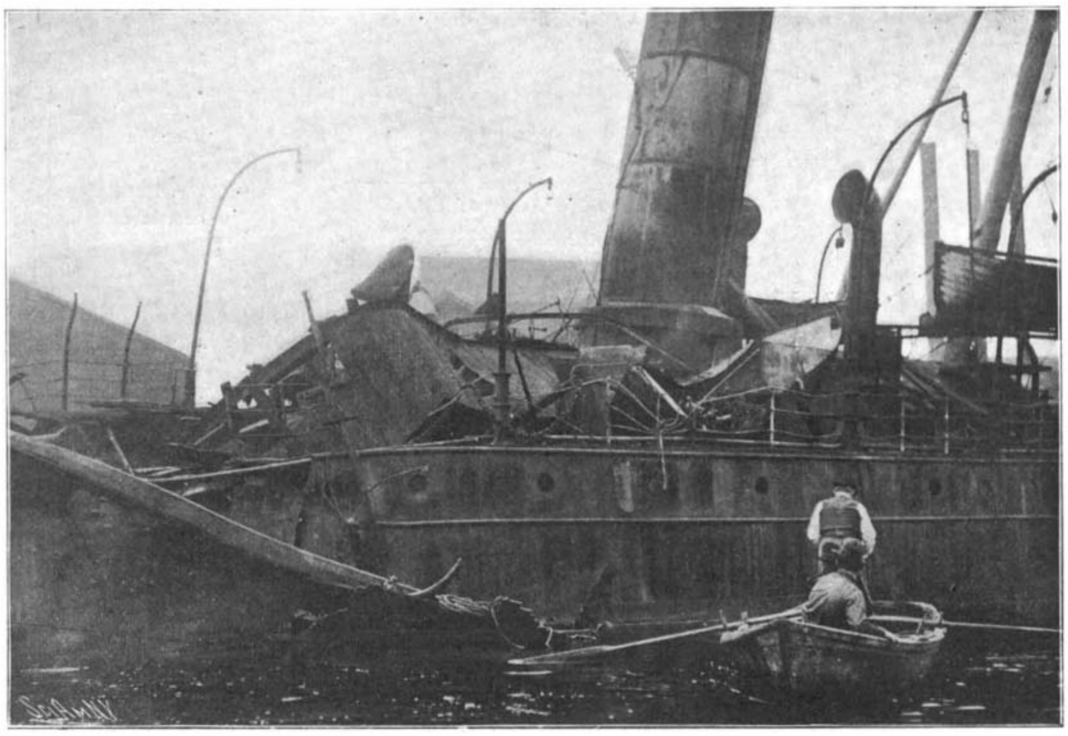


PROF. FORBES AND HIS RANGE FINDER BEHIND COVER.

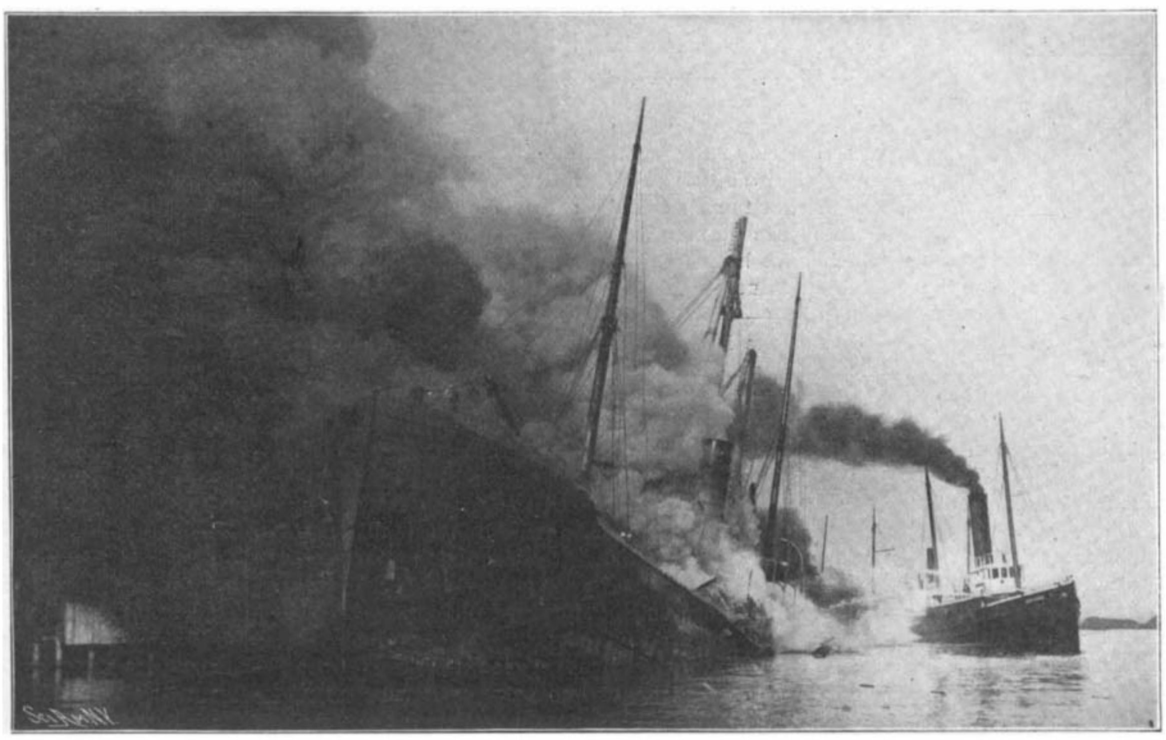
drawn from traffic and taken to the ship yards of the Fulton Iron Works, San Francisco, to be converted into an oil-burning and oil-carrying steamer. She was to be employed in conveying oil in bulk from Texas to northern Atlantic ports. New boilers and engines had been installed. Storage and supply tanks had been provided and in a few days the repairs would have been completed and the steamer turned over to her owners. Engines and boilers were inclosed in a compartment with iron coffer dams or bulkheads provided with water backing. Every customary protection had been employed to make the "Progresso" safe in any contingency. Steam had been raised to test the new machinery. The system of ventilation was thought to be perfect. The storage tanks were empty, as it was intended to carry the steamer to her destination with water ballast. The only oil aboard was about 400 barrels that had been pumped into the supply tank but a few hours before. This oil is said to have come from the wells of Fresno and Fullerton districts. Its specific gravity was 24 deg. California oils vary in specific gravity from 18 deg. to 30 deg. From 18 deg. to 24 deg. is regarded as a fair average.

The weather on the day of the explosion, and while the oil was in the tank, was noticeably cold for the latitude, and the oil, consequently, extremely sluggish in flowing. Two or more qualities of oil were mixed in order to overcome the low gravity of the heavier, though the seller refuses to admit this, and claims that the oil supplied was such as the buyer ordered to be delivered. The tank containing the oil was uncovered at the time the catastrophe occurred. Some sixty mechanics and men were employed about the steamer, mostly in the hold, where the light was dim and the temptation to employ artificial illumination was great. Early in the morning, a violent explosion took place, tearing out the sides of the vessel and completely wrecking the interior. A conflagration followed, blocking all egress from the hold and suffocating a dozen men, who were unable to make their escape. The destruction is so complete that any attempt to raise the steamer will be abandoned. As she lies, her value will only be realized as scrap iron, and the only method of removal will be by the use of dynamite. The responsibility for the catastrophe will probably never be located. It seems to be the confirmed opinion of experts that an unfortunate workman struck a light, for some purpose, which, communicating with the volatile gas arising from the oil contained in the uncovered tank, caused it to explode. The company supplying the oil deny their responsibility, inasmuch as the oil was the same as that burned on many steamers, and heretofore without accident of any kind. The contractors, whose men were employed in making the repairs, assume no responsibility whatever. They are heavy losers by the calamity. A great deal of litigation over the affair is in prospect, and a long investigation by government inspectors is in progress.

Although public confidence in the safety of fuel oil on steamships has received a rude shock, expert opinion is inclined to the belief that the disaster was the result of carelessness in breaking the rules which govern the safe use of liquid fuel.



The wreck of the "Progresso" amidships. The men in the boat are grappling for boilers.



The "Progresso," with her back broken, sinking under the weight of the water thrown into her.

THE BURNING AND THE WRECK OF THE "PROGRESSO."

Prof. Bell's Aerial Experiments.

Rumor has been rife for a long time that Prof. Alexander Graham Bell, of telephone fame, is the inventor of a flying-machine. In the interviews which he has given to representatives of the daily press, Prof. Bell has been extremely reticent. He states, however, that he has not invented a flying-machine, but that he has been engaged in experiments in kite-flying which he believes will have some bearing on the invention of an operative aeroplane. It is understood that Prof. Bell and Prof. S. P. Langley have collaborated to a certain extent in carrying out these experiments.

The tangible result of Prof. Bell's experiments to the present time has been the construction of a kite capable of carrying up into the air a weight equivalent to that of a man and an engine, and of such construction that it is capable of being used as the body of a ship.

THE NEW BRITISH ONE-MAN FOLDING RANGE FINDER.

BY AN ENGLISH CORRESPONDENT.

During the past few weeks the writer had, owing to the kindness of Prof. George Forbes, F.R.S., M.I.C.E., exceptional opportunities for witnessing the working of a new one-man folding range finder, of which Prof.

TAKING A RANGE BEHIND A BUSH.

Forbes is the inventor. Although no official statement has been made on the subject, we have the best authority for stating that the new instrument will very shortly be adopted by the British War Office as the new service range finder for use both with infantry and artillery. It is a curious fact that although the trekometer, which is the present British service range finder, is served out to the British troops in the field, neither this nor any other range finder is ever used by the infantry or cavalry in the field. Even if the trekometer be ever used with artillery, British officers seldom rely upon it because the time taken is excessive, the exposure of the men is objectionable, and the errors introduced by two men dependent upon each other are fatal.

Prof. Forbes in the early part of this year went out to South Africa at his own initiative and at his own expense to test his new range finder, which was the result of work on which he had been engaged, intermittently, for the past few years. After a series of practical trials with his new instrument at the front, the reports were sent to Lord Kitchener, who had taken a great interest in the invention. The Commander-in-Chief's reply was as follows: "Reports sent in on your range finder seem most exhaustive, and I do not think anything further is necessary. I will submit them to the War Office in due course. Regret that I cannot make a personal inspection of the instrument."

The following description of the range finder has been taken from a lecture delivered by the inventor before the Royal United Service Institution:

The range finder consists of two parts, the base and the binocular. The base, which is a tube of rectangular cross-section, consists of two half bases hinged together; each half base is one yard long. On the left half base at the hinge there is a vertical slot facing the range-taker to receive the tongue of the binocular. On the two halves of the hinge facing the range-taker are the middle openings, closed and opened by the middle shutters, which expose to view the glass faces of the middle prisms which are mounted in the tubular base. At the outer end of the base are two cylindrical shutters, which may be rotated to expose the glass faces of the two outer prisms mounted in the tubular base. The outer prisms face the target, and the middle prisms face the range-taker. The binocular consists of two telescopes which are connected by a hinge, so that they may be adjusted to varying angles with each other. Between the eye caps is a horizontal rod on which is a graduated scale called the "distance-of-eyes scale." On looking through either telescope at the sky, a balloon is seen with the tail-rope hanging down. The bottom of the tail-rope is at the middle of the field of view. There are really two balloons seen as one by the two eyes. Each eye cap can be revolved to focus the telescope to suit the eye, and this adjustment may be read on focal scales on each eye cap from +10 to —10 divisions. Adjustment of the left eye cap provides for raising or lowering one balloon relatively to the other. On the right side of the binocular there is a drum head carrying a dial with a flat, spiral distance-scale, registering the number of hundred yards from 500 yards upward. This scale is read by a pointer which moves along the spiral radially, to read successive revolutions. On the left side of the dial is a graduated circle, divided into a hundred parts with a fixed pointer.

Fig. 1 shows the shape of the prisms and the path of the two beams of light from the target entering the two outer prisms, suffering a double reflection at each prism, passing along the tubular base, thence through the middle prisms and entering the binocular parallel to their original direction. The two beams of light pass through the object glasses *GG'* of the binocular, and form two images of the target at *I* and *I'* on the line of the beam of light passing through the center of the object glass. In Fig. 2, if *T* be the target, *AA'* the base, then *II'* are the images of the target. By swinging the telescope at the right so that the light travels along *G i*, which is parallel to *G' I'* then the two

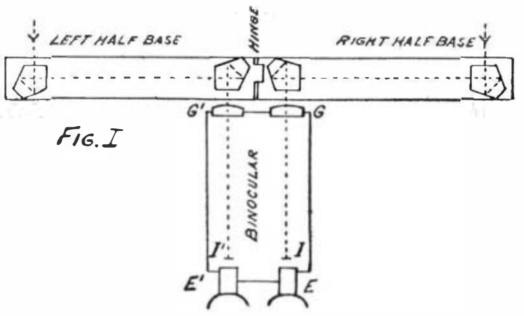


Fig. I

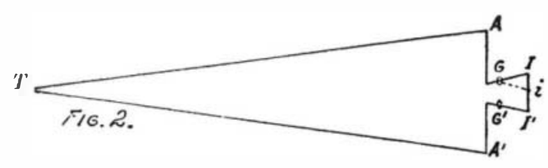


Fig. 2.

images at *I'* and *i* would be seen as one. We measure the distance *I i*, by the drum-head which works a micrometer screw.

$$\text{Now } AT = \frac{GI}{Ii} \times AA'$$

$$\text{or distance of target} = \frac{GI}{Ii} \times \text{length of base} = \frac{GI}{Ii} \times 2 \text{ yards.}$$

$$\text{In the binocular used } \frac{GI}{Ii} = \frac{810}{\text{number of revolutions of drumhead}}$$

So for any distance of target *D* we have to mark that distance on the spiral scale when it and the micrometer screw have turned through a

$$\text{number of revolutions} = \frac{810}{D} \times 2 \text{ yards} = \frac{1{,}620}{D} \text{ yards.}$$

For 1,000 yards it is 1.620 revolutions; for 2,000 yards it is 0.810 revolution, and so on. In this way the graduations for different distances have been calculated.

In order that the range finder may be properly used, it is necessary that every man in the army should have his optical constants determined once a year and given to him on a card for reference. These may read as follows: *L* —1

R 0 This means that left focal scale should

D 66

in this man's case be at —1, the right focal scale at 0, and the distance-of-eye scale at 66 divisions. To take a range the binocular is directed toward the target, and the man is virtually seeing the target by means of eyes placed at the two ends of the base six feet apart. He can then judge relative distances of objects. In looking at the balloon he lays the tail rope of the balloon just above the target and not on any account on it. He notes that he sees both *R* and *L* on the balloon, else he is using only one eye and cannot work. Then by twisting the milled head one way or the other, he brings the balloon near to him or moves it away from him. He should begin with the balloon nearer than the target (by setting the distance scale to 500 yards) and watch the balloon going away as he turns the milled head, always keeping the tail rope above, and never on, the target. He stops turning when the balloon is over the target, and then he reads the difference on the scale in hundreds of yards.

New Chemical Compound.

The aluminate of magnesium is a new product which M. Emile Dufour has succeeded in obtaining. An account of the method used has been presented to the Académie des Sciences. In an electric furnace, using a powerful arc of 1,000 amperes and 60 volts, is heated a mixture of 100 parts of alumina and 230 of oxide of manganese, the heat lasting for 3 minutes. In this way is obtained a porous mass of a brownish-black color, with a metallic reflection. When broken it presents an irregular surface which is of a fine light green color and shows a number of geodes of a brown color lined with brilliant crystals of the octahedral system. To separate the compound the material is broken and treated with hydrochloric acid; gases are given off and the liquid takes a brown tint, which changes gradually to a light yellow. A crystalline deposit is thus obtained which is still further purified and analyzed; its composition corresponds to the formula Al_2O_4Mn. The aluminate of magnesium has the form of small transparent crystals of a light yellow color, having the appearance of octahedra, but somewhat modified on the angles. Their density at 20 deg. C. is 4.12. This body is harder than quartz, and its powder is of a light yellow color. It is quite stable under ordinary conditions, but oxidizes easily when heated in air. At a red heat it gradually changes color to a dark brown, becoming somewhat lighter upon cooling. In oxygen this oxidation, which was before only superficial, is more rapid and takes place below a red heat. Fluorine attacks it with incandescence at a red heat, but it is not acted upon by bromine, iodine or sulphur. It is insoluble in hydrochloric acid, but is easily attacked by nitric and hydrofluoric acids, and especially by sulphuric acid. Oxidizing agents, such as chlorate and nitrate of potash in fusion, and also the alkaline oxides or carbonates, decompose it easily.

Test of a Steel Road.

The new steel trackway on Murray Street, between Broadway and Church Streets, New York city, was recently tested with a two-horse ashcart with a hopper body of sheet iron, the whole weighing 3,700 pounds. Instead of a dynamometer a short ice balance was used. It was found that the cart was started on the steel by a pull of 320 pounds. The wheels were somewhat too wide for the track, so that it was difficult to keep them from binding on one side or the other against the flanges of the steel plates. It was while they were thus bound that a pull of 320 pounds was required to start the cart. Later it was found that only 200 pounds was required. After it had gathered way, the cart was kept moving by an average pull of 100 pounds.

The Current Supplement.

The current Supplement, No. 1410, is distinguished by the usual variety of articles on engineering, electrical and mechanical subjects. The opening of the Assouan Dam is commemorated fittingly by a discussion of its engineering features and by illustrations of its more prominent portions. The English correspondent of the Scientific American continues his discussion of water-tube boilers. The present installment deals with the British Stirling boiler. Sir W. H. Bailey discourses in a scholarly way on the mechanical inventors of Lancashire, England. "Irrigation" is the title of a copiously illustrated article on a matter which, to the western portion of the United States in particular, has been of immeasurable importance. The article describes painstakingly the best methods of irrigation which have been followed in this country. Mr. F. T. Jane continues his interesting fictitious naval battles.

One of the latest long-distance and high-speed electric railways is that from Seattle to Tacoma, which has recently been completed and put into operation. The power is furnished from the Snoqualmie Falls plant, which is thirty-one miles from Seattle. The line is about thirty-four miles long, and the current is transmitted outside of the cities at 27,500 volts; and at substations distributed along the line, this alternating current drives motors direct-connected to direct-current generators, which will supply the third rail with current at 600 volts. The third rail weighs about one hundred pounds to the yard. It is expected to maintain an hourly service between the two cities. The trains will consist of two cars, as a rule. The motor consists of a combination baggage and passenger car about 42 feet long equipped with motors with an aggregated capacity of 500 horse power, and it is expected to make a speed of a mile a minute.

Correspondence.

The Aerodrome.

To the Editor of the Scientific American:

The article on aerodromes by S. D. Mott, in the Scientific American Supplement, No. 1399, while containing some very ingenious ideas incorporated in the machine therein described, makes the following statements, which I believe are ill-founded, viz.: "In conclusion, it must be acknowledged that this conception eliminates from the problem of manflight the confusing devices usually considered indispensable for maneuvering a so-called airship; . . . or, as it has been more scientifically stated by a practical, conservative engineer, one of the faculty of Columbia University, 'The plan of controlling the direction of the lifting components of your machine by shifting the center of gravity is sound.' "

An examination of the drawings leads me to believe that although if the aeroplanes were rigidly fixed to the body of the machine, including the circular ways of the operator's seat, the center of gravity of the machine *might* be shifted, still, according to the construction of this machine, this is not the case. It seems to me that the only effect of moving around on the circular ways would be to turn the whole body of the machine around the axis of the areoplanes, and that the operator would remain at the vertically lowest position, on the principle of a mouse in a wheel; or to give a comparison more nearly representing the conditions, it would be like a swimmer trying to climb up the side of an empty barrel in the water; the barrel would turn, and the swimmer sink to the lowest position and remain there.

Now, as the aeroplanes in this machine must necessarily have almost frictionless bearings, it seems to me that although you may pull the circular ways around, you cannot alter your relative position toward the line of flight, or raise it above the lowest vertical position.

Furthermore, I believe that unless a rudder of some kind is fixed to the machine, the machine would be absolutely unmanageable, being turned in every direction by the wind, like a windmill or weathervane.

I would suggest to Mr. Mott that he might construct a much simpler machine on the same lines by the use of the marine turbine of Col. J. J. Astor, described in the Scientific American of November 8, 1902, instead of the motive power he describes.

F. McC., Mining Engineer.

Mexico, December 10, 1902.

Effect of Electricity on Plant Life.

To the Editor of the Scientific American:

It has long been a matter of speculation with me just why a rain will help plants so much more than any form of artificial watering. The popular theory is that when water is applied to vegetation by the latter method, the heat of the sun causes a kind of steam to form, which scorches it. This is obviously incorrect. My own conclusion, which I reached some time ago, and which may, for all I know, be the accepted scientific explanation, is that rain stimulates the plants on which it falls because it is charged with electricity, and that the mere wetting of a plant has little effect on it.

A few weeks ago I was reading, in your journal, I believe, of an experiment that confirms my view, and incidentally suggests an idea, which, if carried into execution, might prove of immense value. It appears that some experimenter passed a current through some pots in which plants were growing, with the effect that they showed a decided gain in size and fertility over those similarly situated, but not so treated. The difference, if I remember aright, was forty per cent.

Now, why would it not do to apply water electrically charged to the vegetation, and thus simulate, as nearly as could be, nature's method? The water could be placed in a vessel from which the electricity could not escape, an insulated barrel, for instance, or a pail bottomed with rubber or glass. After the water was charged, it could be applied with the aid of an ordinary rubber hose, with a non-conducting nozzle; and that would be all that was necessary.

Now, I am not an electrician, and have not the means of trying this experiment myself, but if some experimenter would follow my suggestion, I believe discoveries of great practical value might be made.

Sydney C. Haley.

Eustis, Fla., December 18, 1902.

Within the past few months, the Rogers Locomotive Works at Paterson, N. J., have been enlarged by the addition of two large tracts of land. On one of these a new erecting shop is being built, and the other piece will be used for yard purposes principally, although some new buildings will be erected thereon. An imposing building for the construction of tenders will soon be under way, and extensions are being made to the boiler and hammer shops.