Correspondence.

A FORGOTTEN GUN.

To the Editor of the Scientific American:

In one of the sporting magazines I read an article dealing with the various devices used in the transition from the flint to the percussion lock gun. About sixty-five years ago I saw a combination flint and percussion lock gun. While the flint lock was even at that date being superseded, many flint-lock double-barrels were in use. At a shooting match on the outskirts of Edinburgh this gun was used. In each hammer the flint was removed and a piece of bent steel was inserted so that in firing it struck the flash pan close to the vent. The detonators were made very much like the tags on shoe laces. The fulminate was placed in one end, which was closed; in the open end a few grains of powder, closed with a little pellet of wax. When loaded the detonating tags were inserted in the vents. It never missed fire and really was the forerunner of the friction primer still used in many field guns. No mention of this style of gun has been made. It was superior to the old pile lock.

Ames, Okla. W. B. Williamson.

HOW THE PEACE COULD BE KEPT INTERNATIONALLY.

To the Editor of the Scientific American:

I have read with interest your article "To Keep the Peace" in your issue of May 29th, and I think that both you and Mr. Dutton are mistaken in thinking that it would require an international army to enforce the edicts of a court. The same object could be more effectually accomplished by a decree of absolute non-intercourse until the offending power submitted to the decrees of the tribunal.

To make my meaning clearer, I will suppose that at least, at the start, all the nations adhering to the tribunal have disarmed. (Of course, nothing could be accomplished unless all the great powers became parties to the agreement to submit their differences to the court.) Now let us suppose that a power, Germany, for instance, should refuse to arbitrate with France and should hastily summon such men as she could get together and invade France.

In this case, both parties having disarmed, France would be in at least as good a condition to defend as Germany to attack. But let us suppose that the minute Germany takes this course, the tribunal issues an order of non-intercourse, viz., that no mails, no telegraphic communication, no commerce, no passengers shall be allowed to leave or enter Germany, in fact that no intercourse of any kind shall be held with the rest of the world. Would not the citizens of Germany be the first to insist that its government should submit to the decrees of the tribunal—in fact, much more quickly than it would be forced to do so by any armed force, which would be difficult to transport to the place needed, difficult to provision and perhaps be defeated by the forces of the power it was trying to coerce? H. W. Bartol.

Nice, France.

SPEED OF THE "MAURETANIA."

ENGINEER MASTERS OR MASTER ENGINEERS.

To the Editor of the Scientific American:

As regards the relative position or authority of the master and chief engineer on shipboard to-day, as discussed in your recent issue under the caption "Speed of the 'Mauretania'," let me point out that if we look at the conditions obtaining about forty-seven years ago, when the "Scotia," the last of the Cunard sidewheelers, was built, the responsibilities of the master were at least equally as onerous as those of the chief engineer. Sails were also carried in those days, and here is a well-authenticated story I often heard when a boy, that the Cunard company paid the master a bonus for every lower topsail that was fairly carried away by the wind, and old Commodore Judkins obtained this bonus several times while in charge of the "Persia," and subsequently in command of the "Scotia." But if we come to more recent times, and look at such a steamer as the Inman "City of Berlin," built by Caird in 1874, we shall see that the engineer's duties were not augmented, while the master's were, or would have been had the conditions or circumstances under which he then navigated the North Atlantic been known and realized by him. The "City of Berlin," now the U. S. transport "Meade," is 488 x 44.2 x 34.9 to top of "floors." Now, from the plans I have before me, this makes her practically 37 feet molded depth. This exceeds eight-tenths of the breadth. How it is that she did not follow the "City of Glasgow" and the "City of Boston" under the exigencies of hurried loading in the North Atlantic trade is a miracle. Since becoming a United States vessel she has no doubt been carefully handled, and I may point out that no matter how deep the ship is, she can be rendered perfectly stable by judicious loading, and probably her master was aware that she was lacking "stability of form." This, however, was his burden, if he knew it.

But to return to the engine room. The "Berlin" had a low-pressure cylinder of 120 inches, or 10 feet, in diameter, the largest that ever floated; but the revolutions of this engine were only about 54, giving a piston speed of not over 600 feet per minute. Then the auxiliaries were very few. No ballast pumps, no dynamos, no economizers or feed heaters, no forced draft. She had a surface condenser, but the air, circulating, bilge, and main feed pumps were all a part of the main compound engines, and she had not more than four deck engines; so in this department the engineer's work was comparatively light, but he did not know it. Looking at him at work, you would have thought that the whole weight of the universe was on his shoulders.

But the master in those days had to consider the sails, freeboard, and stability. Unfortunately, however, for many thousands of people, this latter he did not understand. He took charge of whatever the owners gave, and they in turn trusted the shipbuilders and classification societies. This seems to show that the master of forty or more years ago had a greater variety of work than the master of a great mail steamer has to-day, while the engineer's work was more limited. In a great turbine-propelled steamer there may be some surcease of labor in connection with the propelling engines, but the number of auxiliary engines is vastly increased. In some ships, instead of ten or a dozen donkey engines there are about a hundred of such, and nearly two hundred cylinders, the operating and repairing of which the average master knows little or nothing about. Then more work has to be got out of the boilers by forced draft and higher pressure. From all this it appears to me, that in the near future the executive officer on a great steamship, instead of being the master of the engineer, will be an engineer master.

Cleveland, O. J. R. Oldham, N.A.M.E.

CONSTRUCTION OF AN ELLIPSE.

To the Editor of the Scientific American:

Having recently had occasion to perform an "envelope" construction for obtaining an ellipse, I made reference to your issue of August 25th, 1906 (page 135), in which J. B. G. gives the following envelope construction for drawing an ellipse when the axes are given:

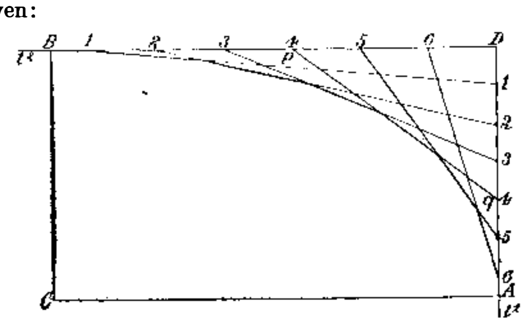

Fig. 1.

Let CA, CB be the axes of the required ellipse. Complete the rectangle $ACBD$, divide DA and DB each into 13 equal parts, and draw lines as shown, each of which will thus be a tangent to the required ellipse.

Now I wish to point out that the above construction is incorrect, or at least that it is only a rough approximation, for the lines in question are not tangents to the ellipse having the given lines as principal semi-axes.

First. Let $a\,b$ denote the magnitudes of the semi-axes. The equation of the ellipse is then

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$$

The condition that the right line $y = mn + c$ may touch this ellipse is that

$$c = \sqrt{a^2m^2 + b^2} \ldots\ldots\ldots\ldots (1)$$

c being the intercept of the right line on the y-axis, and m the tangent of its inclination to the n-axis. Now consider the line 4, 4. The co-ordinates of the points p and q through which it passes are respectively $\left(\frac{7}{13}a, b\right)$, $\left(a, \frac{5}{13}b\right)$. Its equation is, therefore,

$$\frac{x - \frac{7}{13}a}{a - \frac{7}{13}a} = \frac{y - b}{\frac{5}{13}b - b}$$

Put into the form of $y = mx + c$, this equation becomes

$$y = -\frac{4b}{3a}.x + \frac{67}{39}b$$

Here $m = -\frac{4b}{3a}$, and $c = \frac{67}{39}b$, and it will be easily verified that the condition (1) is not satisfied. Hence the line 4, 4 is not a tangent. The same may be shown generally or individually for each of the other lines.

Secondly. When the axes are equal, this construction should give a circle, the form which an ellipse assumes in this special case; but that the curve ob-

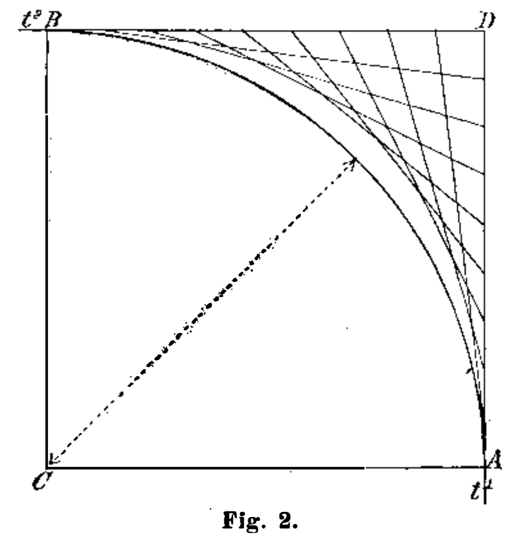

Fig. 2.

tained differs (in the case of the middle radius by as much as 4 per cent) from a true circle is seen in Fig. 2. As a matter of fact, both in this case and in the former more general case, the envelope obtained is a parabola touching DA, DB at the points t_1 and t_2.

Thirdly. An inspection of the figure in question and Fig. 1 on the page of your issue referred to will at once show that the shapes of the two curves differ considerably, though the ratios of the axes in the two cases are, by chance, the same, viz., 2 : 3; the former oval is distinctly "squarer" than the true ellipse.

I append a method of accurately obtaining an ellipse by an envelope construction. It is based on Brianchon's theorem, which states that if a hexagon circumscribe a conic, the three diagonals are concurrent, and the converse of this proposition. Thus:

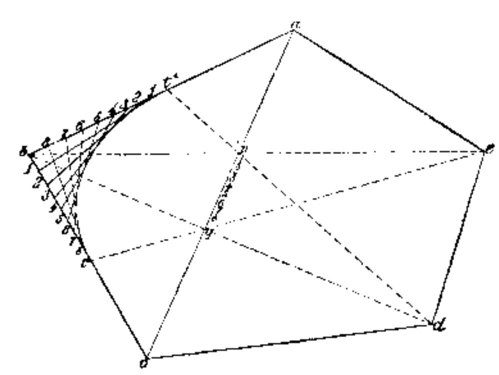

Fig. 3.

Let $a\,b$, $b\,c$, $c\,d$, $d\,e$, $e\,a$ be five given tangents to the required ellipse, which are sufficient to determine it. Join ac, bd, be, and let the two latter cut ac in p and q. Produce dp, eq to cut ab, bc in t_1 and t_2, which points will be the points of contact of the ellipse with these sides. For $a\,t$, $b\,c\,d\,e$ may be regarded as a hexagon, of which the sides $a\,t_1$, $t_1\,b$ are in a straight line and whose diagonals are concurrent; hence, by the property stated above, each of its sides touches an ellipse. Since $a\,b$ can only touch this ellipse once, it follows that t_1 is the point of contact, and the same reasoning applies to t_2. By choosing a range of some 8 points at random in $p\,q$, and by joining d and e to each of these points in succession and producing these lines to meet $b\,t_1$, $b\,t_2$ respectively, two new ranges of corresponding points are obtained; when these are joined as shown in the figure, a series of tangents to the ellipse which touches the five given lines are obtained. The remaining corners may be "taken off" in a similar fashion, but when the construction has been repeated for one of the opposite corners (d or e), with a little practice the rest of the ellipse can be sketched in quite accurately by free-hand.

This construction adapts itself particularly well to obtaining the ellipse of gyration of an area or section, in which five or six tangents are usually first obtained.

Although the following point has no bearing on the above, it might be of interest to some of your readers to know that meters may be reduced to yards by the same method that French pounds are reduced to English pounds, viz., by multiplying by 1.1. This method is accurate to ½ per cent.

Warwick Worthington.

Pembroke College, Cambridge, Eng.

Paint for Shingle Roofs.—The wood surface to be protected must be well coated twice, at short intervals, with hot coal tar and to this coating a thin layer of pulverized screened brick-earth applied. After a few days a perfectly solid mass will have formed, which will not only protect the wood against any absorption of moisture, but at the same time obviate all fire risk, as it perfectly resists flames, especially if, after a few days, the coating is lightly renewed and so much brick-earth applied that the tar appears quite saturated.