6. *With regard to the trepidations of the screw.* That when the propelling surface is arranged in one blade, the trepidations are *very strong*; when arranged in two blades, *light*; when arranged in three blades, *nearly insensible*, and when in four blades they entirely ceased.

7. *With regard to the influence exerted on the slip by the greater or less rotary speed of the same screw.* That the slip of the same screw remained constant at all rotary velocities, the speed of the boat being in the direct ratio of the number of revolutions made by the screw in a given time.

8. *With regard to the influence exerted on the slip by surrounding the periphery of the screw with a thin metallic drum of the same length as the screw, fastened to the blades and turning with them.* That the application of such a drum produces no effect on the slip.

9. *With regard to the influence exerted on the slip by arranging the blades checkerwise.* That the arrangement of the blades checkerwise, which is done by taking half the number of the blades, moving them back their length, and positioning them so that the rear blades intersect the spaces between the front blades, which arrangement causes the screw to be of double length in the direction of the axis, exerts no influence on the slip of the screw.

10. *With regard to the influence exerted on the slip by the length of the pitch.* That the slips of otherwise equal screws are in the direct ratio of the pitches; that is to say, doubling the pitch doubles the slip.

11. *With regard to the influence exerted on the slip by the length of the diameter of the screw.* That the slips of otherwise equal screws are in the ratio of the squares of the diameters; that is to say, halving the diameter increases the slip four times.

(To be Continued.)

For the Journal of the Franklin Institute.

Remarks on W. TURAN'S Article "on Errors committed by Writers on Mechanical Engineering." By THOMAS PROSSER, Civ. Eng.

In the March number of the *Journal*, is an article on "*Errors committed by writers on Mechanical Engineering*," by WILLIAM TURAN, Esq., which is certainly astonishing, not for the errors which it exposes, but for those which it commits.

The quoted assertion of Desaguliers, that "two men working at a windlass with handles at right angles to each other, can raise 70 lbs. more easily than one can raise 30 lbs.," has reference only to their physical organization, which is supposed to enable them to work with greater advantage when one man is laboring most and the other least, and thus equalizing the labor or strain at certain points, which otherwise would test the strength too severely to be endured; just as a man may in some cases perhaps, lift or carry 60 lbs. 70 feet with greater ease than 70 lbs. 60 feet, although the mere mechanical performances are precisely equal. That "the majority of educated scientific men in Europe believe that a gain of power follows, when the handles of a windlass are set at right angles &c.," is a most extraordinary assertion of credulity on the part of the writer.

The gratuitous addition of C. E. to the name of the late J. C. Robertson, Esq., is very significant of the writer's accuracy, and would certainly amuse the recipient, were he alive to enjoy the joke.

Mr. Robertson was a writer to the Signet in Scotland. In 1823 he commenced the editorship of the *London Mechanics' Magazine*,* and in 1835 he connected with it a Patent Agency business. He died Sept. 25th, 1852, and this is, I believe, the first obituary notice that has ever appeared in any *Scientific Journal*, of the man, who, before the London Mechanics' Institute was established, advocated and encouraged the claims of mechanics, and identified himself with that Institute from its commencement—the man who received the highest encomiums from Dr. Birkbeck and Henry Brougham, Esq., M. P. and F. R. S., himself the most accomplished mechanic that ever argued a Patent Case in a silk gown, or sat upon a woosack—now Lord Brougham.†

Desaguliers alludes to the “easily” doing of a thing, not to the power required to do it. One may do a thing, which another cannot do at all, or the same man do a thing one way which he cannot do another, while the absolute mechanical power which is required to do it remains precisely the same.

The quotation from Robertson I cannot find, but the language is very indefinite and quite unlike that which he usually employed in writing upon subjects which he understood, which were certainly not those alluded to; at least, he was not so eminent as has been stated, apparently in order to make out a case.

The placing of cranks at right angles to each other, was, I believe, first introduced by Bolton & Watt, nearly 50 years ago, in a rolling mill. The object in view, was, to avoid the dead centres which exist when one engine only is employed, and also to use a lighter fly-wheel to equalize the motion, a most important consideration too in a cotton mill, particularly where very fine numbers are spun. The first steam-boat with two engines, was upon the Clyde, in 1813, built also by Bolton & Watt, and had the cranks placed at right angles to each other.

It is only on a locomotive, that I fancy any power is gained by placing the cranks at right angles to each other, and that is the power of throwing the engine off the rails, particularly when well “backed up” by a considerable elevation of the outer rail on going round a curve. One engine pulls on one side, and then the other reciprocates it at intervals on the other side, which, being favored by the elevation of the outer rail upon a curve, sets the engine and train rocking until it not unfrequently rocks itself off. Mr. Stephenson took some such view of the

* In the first Vol., he noticed in his Report of the proceedings for the establishment of the London Mechanics' Institute, of which he was one of the Secretaries, that one of the speaker's mode of pronouncing some words, excited a smile, and his friends must have smiled on reading it, for his own pronunciation was, for an educated man, the broadest of Scotch, and so continued until the day of his death. He was of a kindly and social disposition, but a hard worker withal.

† The man who originated almost, the London Mechanics' Institute, and who had therefore, if for nothing else, a right to say that “he had done the State some service,” and who died in its “harness,” received not one passing notice from the press, on his demise, and even the offspring which he had raised with so much anxiety and solicitude, shed not the tribute of a tear of printers' ink upon its pages, to announce to the world that its progenitor had departed this life at the age of 67.

matter when he invented his three cylinder locomotives, which, notwithstanding his high reputation, the necessity for is scarcely as yet acknowledged. And, therefore, I do not expect to make converts to the proposition which I advanced several years ago, and for the doing of which I have only obtained the abuse of those who assume to be the elite of railway engineering

New York, April 2, 1855.

For the Journal of the Franklin Institute.

Investigation of the Angle-Block of Howe's Truss. By J. M. RICHARDSON.

A point of great practical importance in construction is, that all the parts should fit; so that, when put together, they may constitute a perfect whole. Under-pinning, or wedging and keying, to remedy any deficiency of length, breadth, or thickness of the components, is in the highest degree deleterious, and always endangers the stability of the structure. The dimensions, therefore, of each part should be accurately determined beforehand, and no one should be received which does not correspond, in every particular, with the conditions previously ascertained.

With the view of contributing my mite towards perfecting the details of bridge construction, I submit the following general investigation of the angle-block of Howe's Truss, the diagonal brace being perpendicular to the abutting surfaces of blocks.

The quantities given in this investigation are, the distance between the upper and lower strings, the width of bay or pannel, width of brace, height of block, and distance between abutting surfaces of block.

The quantity to be determined is, the degree of inclination of abutting surfaces of blocks.

Let A B C D be a panel of Howe's truss. $AB = a'$; $AC = d''$; $Ac' = c'$; $c'c =$ half distance between abutting surfaces of block $= e$; $eg = c$; $ef = x$; $fg = y$.

$ac = d''$; $-2c' + y = b + y$; $ae = a' - 2e - x = a - x$.

The right triangles, aec and efg , are similar, and give the proportion, $ef : fg :: ac : ae$, or $x : y :: b + y : a - x$. Hence,

$$ax - x^2 = by + y^2. \quad (1)$$

From efg ,

$$x^2 = c^2 - y^2. \quad (2)$$