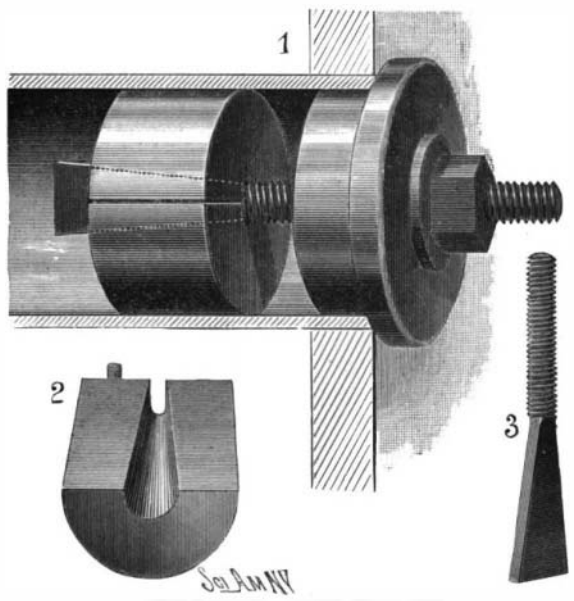
AN IMPROVED FLUE-STOPPER.

A flue-stopper especially adapted to close the ends of boiler-flues has recently been patented by John W. Fleming, 247 Ryerson Street, Brooklyn, New York city.

Fig. 1 is a perspective view of the stopper in operative position. Fig. 2 is a detail perspective view of a section of the stopper-body. Fig. 3 represents a key used in connection with the stopper.

The stopper-body is constructed in two sections, each of which, as shown in Fig. 2, is formed with a groove whose tapering side walls and inclined bottom wall deepen its contracted end. The channel formed by the registering grooves is adapted to receive a key (Fig. 3) having a wedge-shaped inner part and an outer, threaded, cylindrical part. Before the body-sections are brought together, the wedge-portion of the key and a part of the threaded cylindrical portion are placed in the groove of one of the sections, so that the wedge can expand the sections.

When the stopper-body has been properly placed within the tube, the threaded part of the key extends through a cap having a body which enters the flue and which is provided with a flange formed with a



FLEMING'S FLUE-STOPPER.

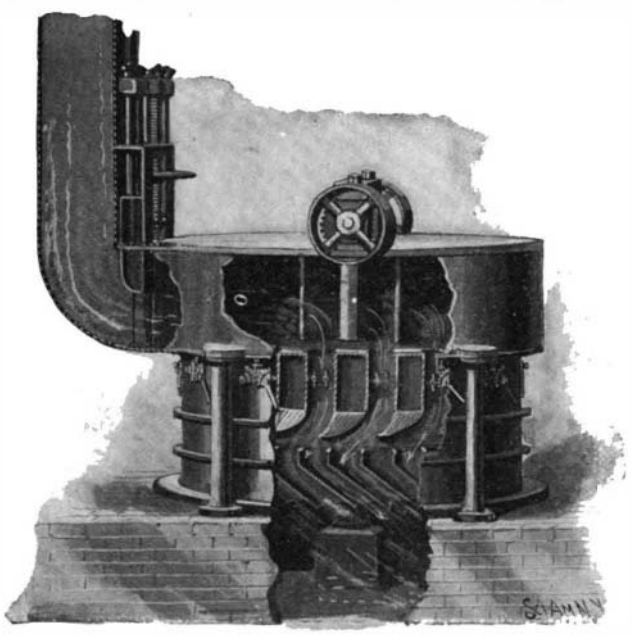
peripheral groove to receive the end of the flue. A lock-nut is carried by the threaded portion of the key and has a bearing on the cap. By turning the lock-nut, the stopper-body sections are expanded; and at the same time the cap is tightly forced against the inner edge of the flue.

AN IMPROVED TURBINE WATER-WHEEL.

A patent was recently granted to John Sharpe, of Gravenhurst, Ontario, Canada, for an ingenious turbine water-wheel, by which it is claimed power can be obtained with a less amount of friction than with the ordinary construction of such machines.

The device is provided with a tank having a walled central opening. Connected with the tank are flumes controlled by gates, which, with their stems, are made hollow, so as to reduce their weight, to permit their being readily raised and lowered, to give access to the air and to allow this air to expand and contract with changes of temperature.

Below the tank a casing is located, in which the turbine-wheel rotates. The turbine-wheel buckets, it will be observed from our illustration, have their upper ends vertically disposed and their lower ends inclined downwardly. The water is directed to the wheel from feed-tubes by conductors curved at their lower edges, so that the water may impinge against the buckets at the proper angle. The feed-tubes are connected with



SHARPE'S TURBINE WATER-WHEEL.

the tank, and are each provided with two cut-offs operated from the exterior by means of gears, to one of which a handle is secured.

The wheel can be made in sizes, from one foot to ten feet in diameter, and can be constructed and transported in sections, which any ordinary mechanic can put together.

WURDEMANN'S DIVIDING ENGINE.

BY CAPT. H. P. SANDERS.

Some years ago Mr. William Wurdemann, of Washington, D. C., devised a novel dividing engine now in the possession of Berger & Sons, of Boston, on which very accurate work has been done in graduating circles for astronomical instruments. As no account of this engine has ever been published, and but few persons are acquainted with its construction, a short description of it may be interesting to many readers of your valuable paper.

Engines of this kind as made by Troughton, of London, and others, consist principally of a circle or wheel supported upon a perpendicular axis and moved by a tangent screw gearing with teeth corresponding to the section of an internal screw cut in the edge of the circle. There are 2,160 of these teeth, so that one turn of the tangent screw moves the circle exactly ten minutes of arc. The circle to be graduated is secured upon the circle of the machine, and the cutting diamond or graver is moved in a radial line by means of a swinging frame attached to the framework of the machine.

The improvements invented by Mr. Wurdemann and embodied in his engine are many and of great importance, securing greater accuracy in results and requiring less attention from the operator, it being automatic in action and driven by a small motor.

The improved machine is shown in the engraving; in it two driving screws are employed, geared together so as to move in the same direction and at the same speed, and arranged on opposite sides of the circle. Driving the circle by two screws tends to divide and equalize any errors or differences arising from slight imperfections in the gear teeth or screws, and any wear of the parts has a tendency to eliminate the errors. Furthermore, in consequence of the greater contact surface between the moving screws and the engaging teeth of the circle, there is less pressure and friction on these parts and the bearing is relieved of side pressure.

The moving screw has a drum-head graduated to 120, so that the automatic movement may be arranged to five seconds of arc. There is also a second drum-head with 200 graduations arranged for dividing the circle according to the centesimal system.

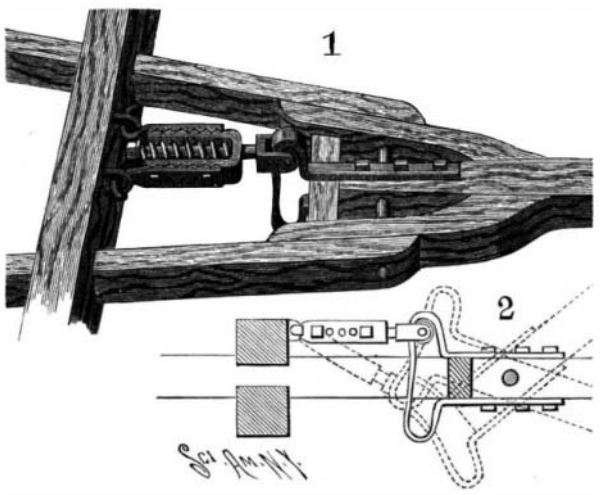
The axis of the circle is of novel shape, it being a perfect cylinder where attached to the circle and ending below in a hard steel cone that bears the weight. The effect of this long cylindrical axis is that the circle turns with uniform ease under all conditions of temperature. The axis enters a cast iron column, into which its upper end is perfectly fitted, so as to turn easily without any possible shake. The column is supported on a cast iron tripod with three leveling screws that step into iron cups. On the upper part of the column is fixed a cast iron frame, on which all the necessary moving parts are supported. The circle and its bearing are of hard cast iron; it will be seen that all the parts are made of a dense hard metal, having a small coefficient of expansion, consequently the working of the machine is not affected by slight changes in temperature.

The bars that carry the tracing works are placed on one side of the circle, so that these works stand out free and accessible in all their parts, while the tracing point is carried directly over the center line of the circle and is not interfered with in any adjustment that may be necessary during any one operation.

Although the circle of the engine is but 30 inches in diameter, a meridian instrument circle of 45 inches diameter has been graduated upon it to two-minute spaces, making 10,800 lines with a very satisfactory result, the probable error not reaching two seconds of arc, a degree of accuracy never before attained.

A NEW WAGON-TONGUE SUPPORT.

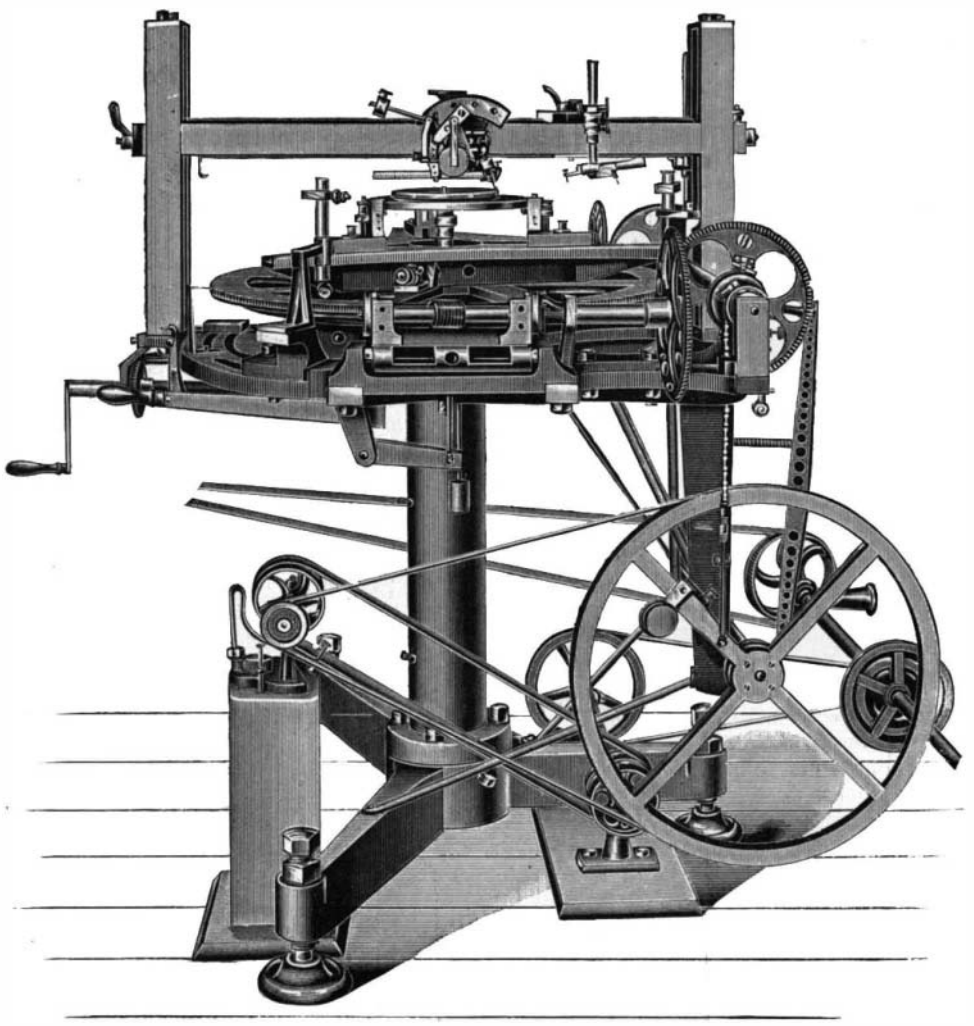
The subject of the engraving presented herewith is a wagon-tongue support, which is the invention of John C. Lambert, of Tonica, Ill., and which is arranged to support the tongue in any desired position so as to relieve the horses' necks from all weight and yet permit free up-and-down movement. Of our illustrations, Fig. 1 is a perspective view and Fig. 2 a sectional side elevation of the tongue support.



LAMBERT'S WAGON-TONGUE SUPPORT.

The support comprises a holder in the form of a curved band mounted on the fulcrum end of a pivoted tongue. The holder is engaged by a friction-roller journaled in the end of a spring-pressed sliding-rod which holds the tongue in position at any desired angle. The sliding-rod has a bearing in a pivoted guideway made in interlocking sections longitudinally adjustable on one another. As shown by dotted lines in Fig. 2, the tongue can be swung either downwardly or upwardly. In the former instance, the friction-roller travels on the inner face of the upwardly-swung holder, the tongue being held in adjusted position by the action of the spring-pressed sliding-rod carrying the friction-roller. In the latter instance, the friction-roller engages the upper end of the holder, the sliding-rod and guideway assuming a lowermost position. It is evident that the tongue, though free to swing at any time, is nevertheless held in any desired position to relieve the horses' necks from all weight. By lengthening or shortening the guideway, the tongue can be adjusted to large and small animals. When the wagon passes into an inclined position or a lower portion of a road, the tongue still retains its relative position.

THE British Association will hold its sixty-ninth annual meeting at Dover, beginning September 13, under the presidency of Sir Michael Foster.



WURDEMANN'S DIVIDING ENGINE.