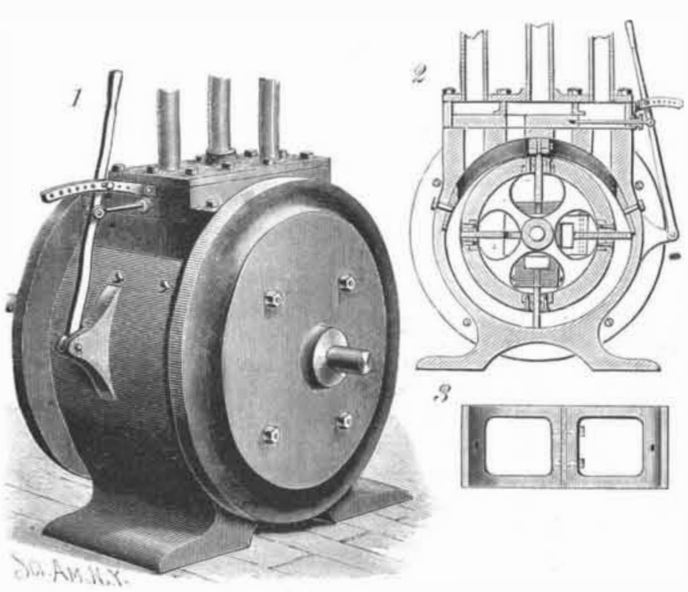
AN IMPROVED ROTARY ENGINE.

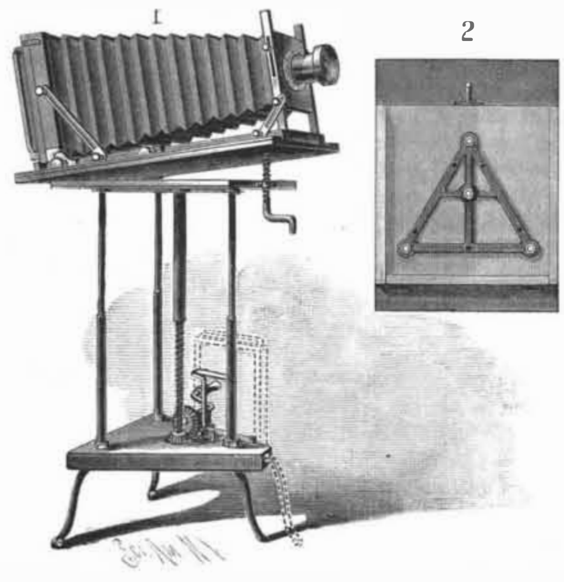
This engine, recently patented by Mr. O. E. Morse, of Dillon, Montana, is designed to utilize the steam to the fullest advantage, and the engine is readily reversed by simply shifting the lever to change the position of the slide valve. Fig. 1 is a view in perspective and Fig. 2 a side sectional view. On the driving shaft, within the cylinder, is secured the hub of a wheel containing a series of four pistons fitted to slide in the rim of the wheel, the opposite pistons being connected in pairs at their inner ends by a slotted frame through which the shaft passes, so that the pistons have free radial movement, one moving inward as the other moves outward, and *vice versa*. The outer ends of the pistons engage the inner surface of part of the cylinder and part of an abutment in the cylinder, an inverted plan view of which is shown in Fig. 3. The abutment is preferably made in two parts, bolted at their outer ends to the cylinder, and connected with each other at their inner ends by bolts and intervening packing strip, and the abutment serves to press an outermost piston inward, so that its opposite mate slides outward into contact with the peripheral inner surface of the cylinder. In the abutment are two openings into which lead four ports opening into a steam chest containing a slide valve having a single port adapted to connect with the two inner ports, the side ports connecting with compartments from which lead the exhaust pipes. The valve stem of the slide valve is pivotally connected with a lever adapted to be locked in any desired position on a segmental arm. As shown in Fig. 2, the slide valve port admits steam through only one of the live steam ports of the cylinder, and the exhaust takes place through the exhaust port at the right, but when the engine is reversed, by swinging the lever outward, the slide valve is shifted to close one of the live steam ports and open the other, and the exhaust then takes place through the exhaust port at the left.



MORSE'S ROTARY ENGINE.

A READILY ADJUSTABLE CAMERA STAND.

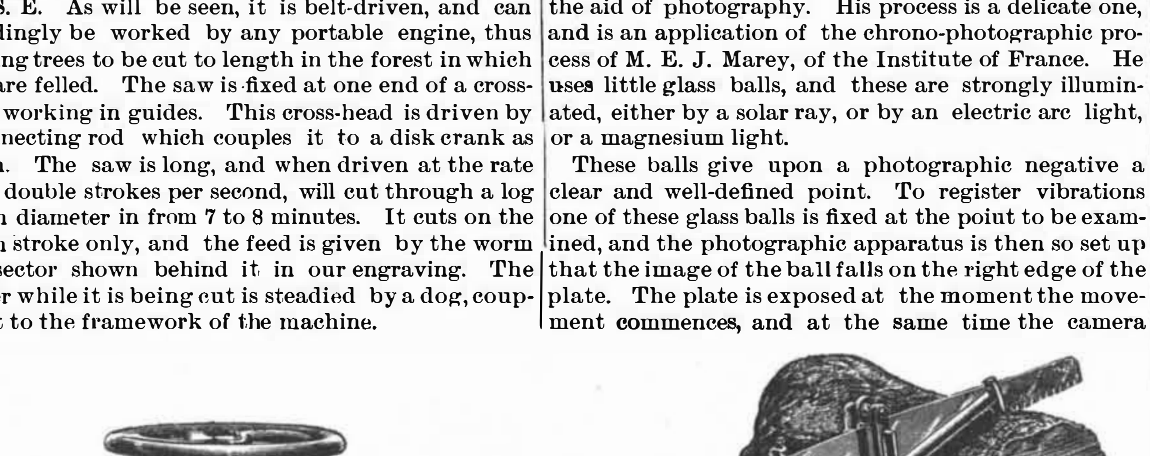
The illustration represents a metal telescopic stand, which can be readily knocked down to be shipped, and the only tool needed in setting it up is a hand wrench. It has been patented by Mr. John H. Green, of No. 604 Pine Street, Ishpeming, Mich. The triangular base piece has three permanent legs, two of them having casters to facilitate moving the stand, while a socket is provided in which may be inserted another leg having a caster, as shown in dotted lines in Fig. 1. Tubular standards near each corner of the base piece are adapted to receive depending guide rods whose upper ends are affixed to a carrier plate, a bottom plan view of which is shown in Fig. 2. Centrally in the base piece is vertically supported a coarse screw cut rod adapted to be rotated by a crank and bevel gear and pinion, the screw engaging a nut in a guide tube centrally dependent from the carrier plate, whereby, on turning the crank, the carrier will be raised and lowered, a pivoted locking arm being swung into engagement with the bevel gear when the carrier has been raised to the required height, and is to be locked in fixed position. A leaf with ledges or flanges on three sides, and adapted to support the camera case, is hinged on the upper surface of the carrier plate, the leaf being raised as desired, at the edge opposite the hinges, by means of an adjusting screw having a crank handle. As will be seen, with this improvement, the camera may be quickly raised or lowered, as necessary to suit the height of the person or object to be photographed, and the case or lens readily adjusted to any desired degree of inclination. Frame pieces on the base piece are adapted to support a plate-containing box, as indicated in dotted lines in Fig. 1, while the operator is adjusting the camera.



GREEN'S CAMERA STAND.

IMPROVED CROSS-CUTTING SAW.

The cross-cutting sawing machine which we illustrate on this page, from *Engineering*, has been constructed by Messrs. F. W. Reynolds & Co., Southwark, London, S. E. As will be seen, it is belt-driven, and can accordingly be worked by any portable engine, thus allowing trees to be cut to length in the forest in which they are felled. The saw is fixed at one end of a cross-head working in guides. This cross-head is driven by a connecting rod which couples it to a disk crank as shown. The saw is long, and when driven at the rate of 150 double strokes per second, will cut through a log 4 ft. in diameter in from 7 to 8 minutes. It cuts on the return stroke only, and the feed is given by the worm and sector shown behind it in our engraving. The timber while it is being cut is steadied by a dog, coupling it to the framework of the machine.



IMPROVED CROSS-CUTTING SAW.

Photographing the Vibrations of Tall Buildings.

Professor Steiner, of Prague, has perfected a method of accurately measuring bridge and floor vibrations by the aid of photography. His process is a delicate one, and is an application of the chrono-photographic process of M. E. J. Marey, of the Institute of France. He uses little glass balls, and these are strongly illuminated, either by a solar ray, or by an electric arc light, or a magnesium light.

These balls give upon a photographic negative a clear and well-defined point. To register vibrations one of these glass balls is fixed at the point to be examined, and the photographic apparatus is then so set up that the image of the ball falls on the right edge of the plate. The plate is exposed at the moment the movement commences, and at the same time the camera is turned from right to left on a pivot. The negative then shows an undulating line which is the vibrations of the ball point in amplitude and duration.

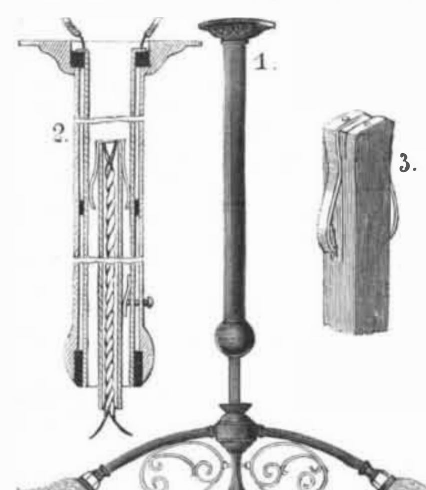
To obtain a scale with which to read this undulating line, a second ball is suspended to a fixed point, to which is given a known rate of oscillation. The position of these two balls is such that their images coincide in a state of rest, and a comparison of the trace of the second ball as printed upon the line of the first on a negative gives the number of vibrations of the latter in a given time.

It is possible then to place near the first ball a fixed scale brilliantly illuminated like the ball itself, and as this scale appears on the negative the amplitude of the oscillations can be measured at a glance. The measurements may be made either directly upon the print or from an enlargement made in the usual manner. To avoid the practical difficulty of making the images of the two balls coincide at the beginning of the operation, Professor Steiner says a pendulum may be made to oscillate before the source of illumination of the ball.

The ball of this pendulum will pass before the light at regular and determined intervals and the undulating line on the negative will be broken at distances corresponding to the duration of an oscillation of the pendulum. It is not important that the camera turns upon its axis with a uniform motion, and the speed of turning is likewise of little importance. The relations of the curves traced by the two balls will always remain the same. It is suggested that an apparatus of this kind would be useful in studying the vibrations of the floors of buildings resting for some years on iron beams, especially when these floors are submitted to the rhythmic shock of dancing.—*Le Genie Civil.*

AN EXTENSIBLE ELECTRIC LIGHT SUPPORT.

This improvement, patented by Mr. Alvin Rivenburgh, of Greenfield, Iowa, consists of a tube containing strips of conductive metal connected with the wires of the house circuit, a tube of insulating material sliding therein, and having contact springs contacting with conductors leading to the lamps through the sliding tube. Fig. 1 shows the electrolier complete, Fig. 2 being a transverse section, and Fig. 3 the top portion of the sliding tube. The hole in the main tube is preferably rectangular, and the metallic strips in its opposite sides are flat. The springs contacting with the strips, on the upper end of the sliding tube, are insulated from each other and connected with the wires extending down the inner tube and leading to the lamps. Additional strips of insulation are inserted in the walls of the main tube to prevent the springing of the metallic strips, and, to hold the sliding tube in any desired position, a spring and a set screw which may be made to bear upon it are arranged in the side of the main tube.



RIVENBURGH'S ELECTROLIER.

Artificial Diamonds.

At the Academy of Sciences, M. Moissan announced recently that, in continuing his researches on the synthesis of the diamond by means of the electric furnace, he has just obtained two compounds well worthy of attention. These bodies are silicide of carbon and boride of carbon. They are of excessive hardness, and cut rubies, steel or diamonds. M. Berthelot asked M. Moissan if in the researches made previous to his own on the subject of artificial diamonds, chemists had not sometimes mistaken for diamonds very dense compounds similar to those to which reference had just been made. M. Moissan replied that he believed errors of the kind might easily occur when analysts are not exactly acquainted with all the characteristics of diamonds. By only bearing in mind their density and property of cutting all other gems, errors may frequently have been made. But, being at present aware of the characteristic of diamonds to burn in oxygen, and to produce four times their weight of carbonic acid, it is now difficult to confound them with any other body.