subjecting them in closed retorts to a dull red heat without access of air, to chloridize the metals, and finally washing out the metal chlorides.

An improved Lathe for turning Masts and Spars has been patented by Henry Kean, of East Boston, Mass. This is a ponderous machine which is capable of taking a log and converting it, in a comparatively short space of time, into a smooth, well-rounded mast or spar. The lathe cannot be properly described without engravings.

Mr. Benson Lent, of Peekskill, N. Y., is the inventor of an improved Blind Hinge, which will be locked automatically when the blind is closed or fully open, and will retain the blind, also, in other positions, and will prevent the removal of the blind from its hinge pin, except when the blind is fully closed or fully open.

Mr. Patrick T. Weir, of New York city, has patented an improved Measuring Attachment for Refrigerating Milk Wagons. The object of this invention is to furnish, for the purpose of delivering milk in cities, improved measures for a refrigerating milk wagon. The measuring vessel serves to measure the milk as it is transferred to the tank, and there is a device for measuring the milk as it is taken from the tank.

Mr. Samuel M. Palmer, of Glens Falls, N. Y., has patented an improved Horse Collar for draught horses. It consists in a hollow perforated metallic pad, and in a device for forcing air through the perforations of the said pad.

Mr. John J. Brady, of Long Island City, N. Y., has patented an improved Step Ladder, which is of novel construction, and is provided with a peculiar hinge for connecting the rear brace with the ladder. By using this hinge the various sorts of stays that have heretofore been employed in preventing the rear braces from slipping backward may be dispensed with, as the hinge limits rearward movement of the braces.

Mr. Alonzo Templeton, of Louisville, Ky., has invented an improved Clamp for Securing Corks in Bottles. It may be readily applied to the neck of a bottle, so as to hold the cork firmly in place while the contents are going through the heating process, and as readily removed in order to allow the cork to be withdrawn.

Mr. Rudolph Loth, of Bridgeport, Conn., has patented an improved Blind Slat Adjuster, for setting slats of shutters and blinds in any desired position, and retaining them rigidly, without the annoying rattling or changing of the position of the same, and without giving a chance to turn the slats from the outside.

Samuel Strauss, of Charleston, West Virginia, has patented an improved Barrel for Shipping Bottled Liquors, and especially bottled beer, in such a manner that the packages may be handled with greater facility than the boxes in which such bottles are shipped at present, and that, furthermore, the bottles may be so packed as to be perfectly safe, and not exposed to the danger of getting injured or broken, the bottles being so supported in the barrel that there is a very small weight on any part of the same. The barrel may be securely locked, and the bottles arranged therein so that every bottle is separated from the remaining bottles, and may be taken out without disturbing the rest. The barrel is also of great advantage for reshipping and returning the empty bottles, and as every bottle can be taken out with great facility, it prevents the reshipping or losing of full bottles, which occurs when the same are packed with straw.

Samuel C. Smith, of Norristown, Pa., has devised an improved Hose Clamp, by which the leaks that frequently occur in the hose during fires may be stopped quickly and reliably, so as to save the time required for changing that section of the hose and prevent the delay incidental thereto.

Samuel Maneer, of Craigvale, Ont., Canada, has invented an improved Pole Tip for attachment to the tongues of vehicles for connecting the neck yoke with the tongue, which may be adjusted outward or inward upon the tongue, according as longer or shorter horses are to be used.

An improved Balloon has been patented by Mr. James Tracy, of Waltham, Mass. The object of this invention is to so improve the construction of balloons as to enable an aeronaut to vary the capacity and buoyancy of his balloon for sustaining it at any desired altitude, and for ascending or descending, without the use of hydrogen or other gas for the purpose, simply by varying the space of vacuum.

Mr. Simon L. Pollock, of St. Paul, Minn., has patented an improved Fireproof Shutter, formed of an interior and an exterior sheet iron wall, separated from a central partition wall by metallic cross strips, and joined at the edges by flanges to form closed chambers for inclosing air without admitting its circulation.

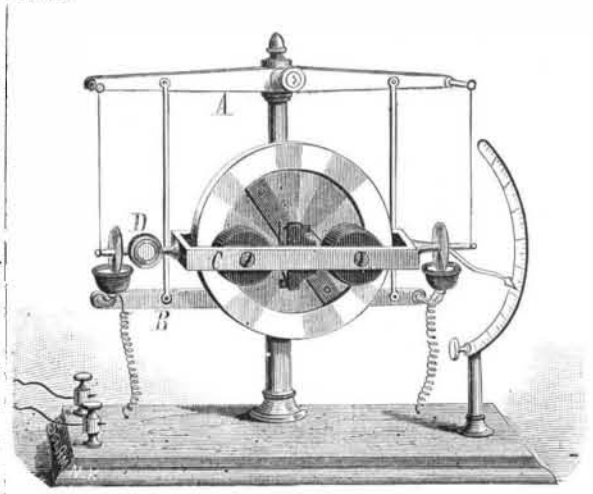
ELECTRICAL INDICATOR FOR SHOWING THE ROTATION OF THE EARTH.

BY GEO. M. HOPKINS.

In my article on this subject in No. 1 of the current volume, a form of instrument is shown in which the index is placed in a horizontal plane, and would indicate an hourly motion of 15° at the poles, while at the equator it would not indicate at all.

In the accompanying engraving an instrument is shown which is suspended with the axis of the wheel supporting frame, C, at right angles to the plane of the equator and parallel with the polar axis of the earth. The frame, C, is suspended by silk threads from studs that project from the beam A. Two vulcanite mercury cups are supported by the beam B in position to make an electrical connection with the disks on the axes of the frame, C. These cups are connected by a spirally coiled wire with the binding posts that receive the battery wires. The beams, A, B, are connected by rods, so that when it is desired to adjust the instrument the parts will maintain their proper relation.

Upon one of the axes of the frame, C, there is an index that moves in front of the scale of degrees. Upon the other axis there is a small mirror, D, for receiving a beam of light and projecting it on a screen. By this arrangement a very long index is secured without additional weight or momentum. For this suggestion I am indebted to Professor A. M. Mayer, who also suggested in his communication in No. 3 of current volume the suspension of the instrument by silk fibers.



The instrument shown in the engraving should, when the axis of the frame, C, is adjusted equatorially, indicate 15° motion per hour in any latitude. The possible application of this instrument in a larger form to equatorial telescopes in place of the present clock trams, suggests itself. The only difficulty, if any, would be in providing telescope mountings of sufficient delicacy.

The arrangement of the wheel, the commutator and connections is substantially the same in this instrument as in the one previously described.

TIN SHAFTING CUP.

Our attention has been called to above cup as a simple yet effective device for conducting grease to the bearing for the purpose of lubricating in place of oil. We say simple because it works automatically and requires very little care compared to oil cups; and that it is effective and economical is demonstrated by the fact that it feeds only as lubrication is required, and thus all the lubricant is utilized, one pound of the grease doing as much work as two gallons of oil. It was supposed that when cups were invented to feed oil to the bearing as required, we had reached perfection in lubricating, but by the use of grease a coating is formed on the bearing which remains to do the work.

The question now is as to the best grease and cup. In 1875, the judges at the American Institute, New York, gave to Professor Thurston, who is authority on lubricants, five samples of oils and greases, to be tested as regards their lubricating qualities. They were marked A, B, C, D, E. After some three thousand tests made carefully and thoroughly, occupying three months to make, the result was given to the judges that the grease marked D was ahead of all competitors as a lubricant. And on this report the silver medal of the American Institute was awarded to R. J. Chard, 134 Maiden Lane, New York, whose patent lubricene was represented by letter D.

The report of the judges at Philadelphia on his patent cup, of which we give an engraving, was that it is the best friction feeding cup.

The engine that furnishes the power to machinery in American department at the Paris Exhibition is fitted up with patent lubricene and cups. The engraving needs but little explanation. D, the feeder, passes through the body of the cup, A, with its cover, B, and also the screw cap, C. This cap, fitting over the spring of the feeder, is movable, and can be adjusted to regulate the feed by the pressure given to the spring. This principle of feeding lubrication to the bearing is the only true automatic and economical principle. The cost of lubricating is thereby reduced to its minimum. This cup is adapted to ordinary shafting, and is very effective, and can be set and will work at any angle.

THE MUSICAL MECHANISM OF THE CINCINNATI ORGAN.

We recently referred to the large organ lately erected in the new Music Hall at Cincinnati as being among the largest pipe organs in the world, certainly the largest ever made in this country. It comprises five different organs, namely, the great organ, the swell organ, the choir organ, the solo organ, the pedal organ; these may be played separately or in combination. There are four key-boards, each composed of 61 notes (from C_0 to C_4), five octaves long, and each controls the valves that admit the compressed air to the pipes belonging to its particular organ, or division of the whole organ. Just above the great organ key-board are placed five white thumb knobs, and a smaller black one near each, while between each pair is a tablet showing its use. These thumb knobs control the couplers by which the various key-boards are connected to the great organ key-board, so that either may be played from it without removing the hands. Under the manual key-board there is the pedal key-board, which has a compass of 30 notes (from C to F_0), two and a half octaves. Here there are the white and black keys, the same as on the manual key-boards, only made of wood instead of ivory, and larger, as they must be played with the feet. This key-board opens the valves to the pipes of the pedal organ, which includes the immense thirty-two foot open diapason pipes.

Just above the pedal organ key-board lies the crescendo pedal, a slide having frequent projections against which the feet are pressed in operating it. Above this, again, there is a row of combination pedals, ten in number, and in the center the swell pedal, which is so nicely balanced and adjusted that a very slight movement of the toe or heel causes it to act, and yet it remains exactly where it is left. To the right and left of the manual key-board are terraces of knobs, angled so as to front the organist, and all within easy reach. The organ, therefore, has four manuals or key-boards of five octaves each, and a pedal key-board of two and a half octaves. The great organ has 22 complete registers, 228 pipes. The swell organ has 19 complete registers, 1,708 pipes. The choir organ has 17 complete registers, 1,281 pipes. The solo organ has 7 registers, 366 pipes, and 32 bells. The pedal organ has 16 complete registers, 600 pipes. There are 15 mechanical registers, and 14 pedal movements. A summary of these gives 96 registers, 6,237 pipes, 32 bells, 14 pedal movements.

In the cellar under the organ is the foundation upon which the organ stands. Large brick columns, placed closely together, reach from below the surface to the heavy capping timbers on which the floor timbers ar laid. These are covered with two thicknesses of flooring, the upper one of which is of two inch pine, the whole forming a support that will sustain the immense weight of the instrument without the slightest deflection.

Five motors are employed to operate the five bellows in the organ. To supply these motors, a six inch pipe is led into the cellar from the street main, branches from which convey the water, having a pressure of 52 pounds per square inch, to the motor. Each branch has its shut-off and regulating valves independent of the other; so that in case anything should happen to either, the others can be worked. Here also are the levers for hand blowing, so that, should the water pressure fail at any time, man power can be substituted.

The bellows consists of two parts—the feeders and the reservoir. The feeders of these bellows are known as square feeders, in distinction from those usually employed, where they are hinged on one side, called diagonal feeders. Those here are one half the size of the bellows each, and arranged so that as one is going up the other is coming down. As one drops down, the valves in the bottom open, allowing it to fill with air, which close as soon as the motion changes. The air is then compressed until it raises the valves between the feeder and the reservoir, allowing the air to pass into and inflate the reservoir. To obtain the necessary wind pressure, weight is placed upon the top of the reservoir, and in the aggregate about 5,000 pounds is used for this purpose. Beyond the bellows, on either side, are the lower pipes of the 32 foot open diapason, those seen on each wing of the organ from the hall. By placing a rule on the lower C, it is found to be 24 inches in width by 30 inches in depth, with a mouth seemingly large enough to require a bellows of its own to furnish a supply of wind for it.

Back in the rear, against the wall, are the pipes of the contra-bombard, 32 feet. On examination of the lower note of this register it is seen that the tone is made by the vibration of a piece of brass, called a "reed," 13½ inches long, 1¼ inch wide, and $\frac{3}{16}$ inch thick. It vibrates very slowly, but with such an effect as to be heard even when all other registers are used. The work of construction was begun by the builders, Messrs. E. & G. G. Hook & Hastings, of Boston, Mass., in May, 1877.