

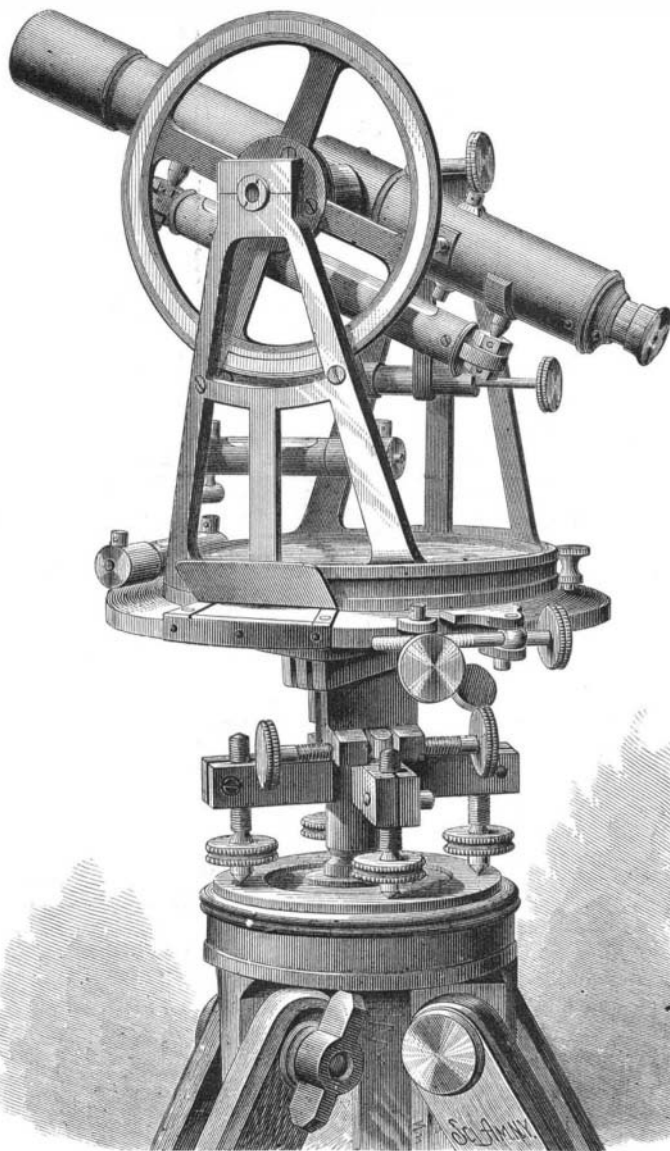
fering from an ordinary iron lamp post. But there could be little doubt that if a few large electric lights, high up, were used for street illumination, the same sort of result as has been obtained at the Albert Hall would be arrived at. The cost of using gas in Sheffield for lighting large halls, such as the one they were now in, factories, and the streets, could be halved if electric currents, generated by water engines, worked by hill streams, as well as by very large steam engines, were substituted for gas. It was not necessary for him to tell them how he proposed to employ the electric light to illuminate private rooms, if only he could get people to throw away the notion that to light a room they must have something with a globe on it, like an oil lamp; nor was it necessary for him to remind them that by whitewashing the walls—yes, by whitewashing even the very machines themselves—in some of the Paris factories, the supposed strong shadows cast by the electric light had been less than the strong shadows cast by another bright light, one that we not only put up with, but one that from the force of habit we were tolerably contented with, namely, the sun. At present he was concerned with the pounds, shillings, and pence question, which had more than usual weight in these days of slack trade. Assuming that the cost of gas for lighting the large buildings, factories, and the streets of Sheffield could be halved, also that where it was used for heating purposes the expense could also be halved, by substituting electric currents generated by very large steam engines at certain points, and by turbines driven by falling water out of the town; then they would save per year about £45,000. Supposing, also, that the cost of producing motive power could in the same way also be halved, this represented an annual saving of something like £60,000. In reality, he believed this last economy would be larger, since not only could power be produced so much more economically than by small steam engines or even by a large engine, when a large proportion of its power was, as now, wasted in driving the shafting alone in their factories; but, in addition, much hand work could be economically replaced by machine work. And, lastly, supposing the consumption of coal in Sheffield for heating their metals and for heating their houses could also be halved, then there was another saving of about £300,000 a year; or, altogether, the annual saving that might be produced in this town alone, by substituting electricity for coal, would be something like the large sum of £400,000.

Last year, two French engineers, MM. Chretien and Felix, at Sermaize (Marne), actually plowed fields by electricity, the electric current being produced by two dynamo-electric machines of a form invented by M. Gramme. These machines were usually worked with a steam engine at some convenient place three or four hundred yards away in an adjoining road, and the electro-motors were also two Gramme machines, one on each side of the field, with their coils revolving of course backwards. Through one of these the electric current was sent alternately, so that motion was given to one or other of two large windlasses, one on each of the wagons containing the electro-motors. In this way the plow, which could be used going in either direction, was first pulled across the field, making a furrow, and then back again, making another parallel furrow. If electricity were produced in large quantities at certain centers, then one difficulty that would of course be met with would be that of distributing it properly, since, just as in the case of water or gas, if a large branch pipe in a main be suddenly opened then the supply going on to the other branch pipes in the same main would be diminished, a result causing serious inconvenience in the case of electric lighting. But just as automatic governors had been devised for water and gas, to keep the supply constant, so automatic "electric current regulators" had been devised by M. Hospitalier and by Dr. Siemens, to keep the current constant. One of those invented by Dr. Siemens was on the table before him, and the general principle of its construction was easily understood. As the current passed through the regulator it heated a very thin ribbon of steel, which consequently expanded. The effect of this expansion was to introduce coils of wire into the circuit, the extra resistance of which diminished the strength of the current. Consequently the stronger the current the more was it automatically resisted, and the weaker it became the less was it resisted, and so it remained practically constant at any desired strength for which the regulator was previously adjusted. In conclusion the lecturer said there was a time when "not only in the villages around old Sheffield," so said the historian of Hallamshire, "were the file makers' shops or the smithy to be seen, with the apprentices at work; but even on the hillside in the open country, at the end of the barn, would be the cutler's shed, while in the valley below, by the river, was the grinding stone ready to sharpen the tools that had been manufactured." And why not now? Why should not that mountain air that had given the workmen of Hallamshire in past times their sinew, their independence, blow over their grindstone now? Why should not division of labor be carried to its end, and power brought to them instead of them

to the power? Let them hope, then, that in the next century electricity might undo whatever harm steam during the last century might have done, and that the future workman of Sheffield would, instead of breathing the necessarily impure air of crowded factories, find himself again at the hill side, but with electric energy laid on at his command.

IMPROVED ENGINEER'S TRANSIT.

The two instruments shown in previous numbers, made by Fauth & Co., were purely astronomical ones. We now illustrate an instrument familiar to most of our readers—an improved engineering transit. This is the standard instrument as furnished by Messrs. Fauth & Co. to the government department that are using this class of apparatus, and it is rapidly gaining favor with railroad engineers and surveyors. The instrument is constructed so as to give great strength with little metal. Instruments of this construction have not sustained serious injury by heavy falls. The telescope standards, which in the old form are merely held on the plate by means of screws, are in this instrument cast on a common base and radiate out from the center, giving the superstructure a firmness which cannot be secured by any other method. A glance at the engraving will give a clear idea of the construction and arrangement of the various parts, and we will only add that the graduations are on silver; the telescope is powerful, and has an achromatic objective. The compass needle is 5 inches long, and the whole is made with



FAUTH & CO'S ENGINEERING TRANSIT.

a view to economy in first cost as well as to the quality of the instrument.

For further particulars address Messrs. Fauth & Co., Washington, D. C.

MECHANICAL INVENTIONS.

Mr. Peter Cooper, of New York city, has recently patented an improvement in propulsion of railway cars, which consists in a combination of well known mechanical powers, by which trains of cars can be propelled at any desired speed by means of an endless chain or wire rope. The endless chain or rope is to be borne up in its entire length by being fastened firmly to the outside and in the center of as many sets of cars as there are stopping places on the whole line of the road. The stopping places are to be all of equal distances apart, and there will be bearing trucks between the different sets of passenger cars to prevent the chain from dragging or rubbing against anything in its passage around the circuit. The endless chain or rope, with the attached cars, is made to pass around a large drum wheel placed at each end of the line, which is to be of sufficient strength and operated by sufficient power to move the whole line of cars. By having stopping places at equal distances apart the rails can be so elevated as to use up the momentum of the cars in their ascent of the elevation at each stopping place. The elevation will be sufficient to

bring the cars to rest and hold the power ready to be given out at once by all the cars going over the ascent at the same time. This will give back all the power consumed by forcing the cars up the ascent, and will reduce the necessary propelling power to that required on a dead level.

Mr. William H. Ellis, of Brooklyn, N. Y., has patented an improved umbrella drip cup, which consists of two conical cups connected together at the base, the outer one joined at its smaller end to a tube, into which the lower end of the umbrella stick is entered and secured so that the cup is just under the umbrella; by this means, when the umbrella is folded up, the water runs down and is caught and retained in the chamber between the two cups, from which it slowly runs out through the perforations in the connected base of the cones when the umbrella is again lifted or reversed.

Charles E. Fox, of Mount Pleasant, Mich., has invented an improved washing machine, which consists of one or more rollers arranged transversely in relation to the corrugated face of the wash board, and having a crank and gear attachment, the parts being mounted in a suitable frame, which is attached to the wash board, and adapted to yield so that the rubbing rollers act on both small and large fabrics.

Mr. David L. Towslee, of West Salem, O., has invented an improved drag sawing machine, so constructed that it may be worked by the operator with both hands and feet, or with either his hands or his feet. It is simple in construction, easily operated, and apparently effective in operation.

Mr. Martin Williams, of St. Johnsville, N. Y., has invented an improved thrashing machine, that runs steadily and easily and effects a thorough separation of the grain from the straw.

An improved device for lighting a fire automatically, at any given time, has been patented by Mr. Eibe H. Doescher, of Homestead, Ia. The invention consists in the combination of devices that cannot be readily described without an engraving.

A simple and effective device for automatically regulating the height of water in a steam boiler, has been patented by Mr. John Bridges, of Leon, Iowa. The invention consists of a novel construction and arrangement, in connection with a boiler, of a float, valve, and pipes, and their connections, with a feed pump.

Thaddeus C. Histed, of Junction City, Kan., has invented an improvement in that class of washing machines in which beaters are employed in connection with a rotated tub; and consists in the peculiar construction and arrangement of mechanism by which the work is thoroughly done.

Mr. Sylvanus A. Fisher, of Geneseo, Ill., has invented an improved wire stretcher, which consists in a lever fitted with a cam-acting holding jaw, by which the wire is securely held and from which it may be readily released.

An improved washing machine has been patented by Mr. Melvin A. Tinker, of Fairfield, Ill. The invention is an improvement in the class of washing machines composed of rolls held in yielding contact by means of springs, the bed rollers being arranged in the arc of a circle and enclosed or covered by an endless apron.

Mr. Soren Andersen, of Stronach, Mich., has patented an improved saw grinder for grinding saws down to as thin a gauge as they will work at, thereby rendering the waste in sawing as small as possible. It saves power; and by means of this combined grinder and gummer, saws can be used until they are actually worn out or worn down too small for use.

An improvement in smoke stacks has been patented by William F. Cosgrove, of Jersey City Heights, N. J. It consists in providing the stack with an inclosing jacket, in the double conical head of which is supported an inverted perforated cone and a screen for deflecting the products downward, where they fall upon an inclined collar surrounding the stack which leads them to a spout, whence they are conveyed by a pipe to a chamber formed in an extension of the boiler shell.

Messrs. George Coombs and Charles S. Blakeslee, of Chariton, Ia., have patented an improvement in car couplings. This is a simple and effective self coupler for cars, but it cannot be described without engravings.

Photographic Illustration of Mental Operations.

Professor Huxley illustrates his argument respecting complex impressions which are more or less different from each other by reference to composite portraiture, thus: "This mental operation may be rendered comprehensible by considering what takes place in the formation of compound photographs—when the images of the faces of six sitters, for example, are each received on the same photographic plate for one-sixth the time requisite to take one portrait. The final result is that all those points in which the six faces agree are brought out strongly, while all those in which they differ are left vague; and thus what may be termed a generic portrait of the six, in contradistinction to the specific portrait of any one, is produced."