Progress of the Birmingham Compressed Air Power Scheme.

Mr. J. Sturgeon, the author, pointed out that, although each 1,000 horse power at the central station may only produce 500 effective horse power at the users' engines, it will displace fully 1,000 horse power of small boiler plant, furnaces, chimneys, etc., and the same engines can be used with compressed air as with steam. The centralization principle enables engines and boilers to be used of large power, with all the modern improvements, such as high pressure, triple expansion, gas firing, etc. At the pressure proposed (45 lb.), the air-driven engines will indicate from 30 to 65 per cent of the power developed at the main engines, according to the mode of using the compressed air.

According to the investigations of Sir F. Bramwell and Mr. Piercy, on behalf of the Birmingham corporation, the present consumption of fuel in small engines of from 4 to 25 horse power varies from 36 lb. to 8½ lb. per horse power per hour; and as it is estimated that compressed air power would reach the consumer at an expenditure of from 5 lb. to 2·3 lb. fuel per horse power per hour, a saving of from 700 to 400 per cent is effected. The works will be situated on land fronting Garrison Lane. The first portion is laid out for the erection of fifteen engines of 1,000 horse power each, to be worked by Lane's patent boiler and Wilson's gas producers.

As the company have already received applications for over 3,300 horse power, they have entered into contracts for the completion of 6,000 horse power at the central station before May 31, 1887. The mains will all be of wrought iron, laid in concrete troughs near the surface of the road, so that they can be easily got at for examination and repairs. They will vary in size from 24 down to 7 inches. Valves will be provided, by which, in case of damage to any portion of main, that portion will be automatically stopped off from the rest of the district, so as not to interrupt the general service. The compressed air will be sold to users at a price per 1,000 cubic feet of air of a standard pressure of 45 lb., measured by a meter so constructed as to register the volume delivered at the value of the standard pressure, independently of any variations there may be in the main pressure. The meter consumption of the various users will be registered in the gross on a dial at the central works by electric apparatus, so that any waste or misuse of the air can be at once discovered and prevented. Compressed air can be used for all purposes for which steam is employed, except heating. Air, on the other hand, has the advantage over steam that it is available for refrigeration.

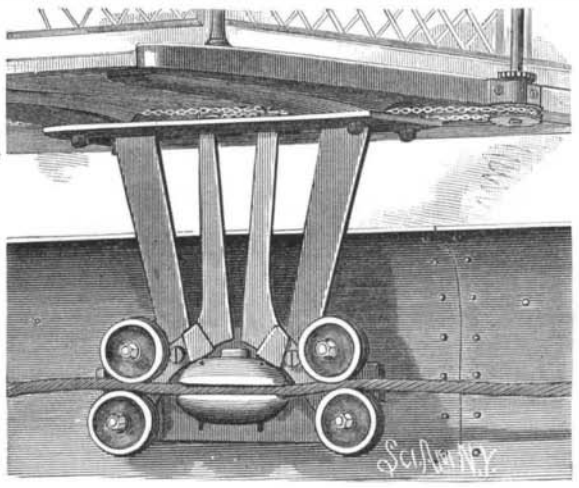
How to Make Phosphorescent Materials.

The sulphate of calcium, which is remarkable for its violet phosphorescence, and forms the basis of some luminous materials, has been analyzed by M. A. Verneuil, who finds it to contain monosulphide of calcium 37 per cent, lime 50 per cent, sulphate of lime 7 per cent, carbonate of lime 5 per cent, with traces of silica, magnesia, phosphates, and alkalies. He also finds that it is a *coquille* shell which furnishes the lime used. M. E. Becquerel has made extensive researches on these luminous powders, and M. Verneuil has more recently followed up the subject. He gives the following process for preparing what he considers the most beautifully phosphorescent matter known. Twenty grammes of lime from the *Hypopus vulgaris* shell, calcined, is pulverized and intimately mixed with six grammes of sulphur and two grammes of starch. To this mixture is added drop by drop a solution containing half a gramme of subnitrate of bismuth, 100 cubic centimeters of absolute alcohol, and some drops of chlorhydric acid. When the most of the alcohol is evaporated by exposure to the air for half an hour, the mixture is heated in a covered crucible for twenty minutes to a clear cherry heat. This temperature is obtained easily by wood charcoal or a Perrot gas furnace. After pulverizing the mass, it is again calcined at the same temperature for a quarter of an hour. If not too strongly heated, the product obtained is small grained, lightly agglomerated, and easily crumbled. A new pulverization is to be avoided, as it tends to diminish the phosphorescence. The addition of sulphides of antimony, cadmium, mercury, tin, copper, platinum, cranium, zinc, molybdenum, produces a variation in the color of the light, which varies from yellow green to blue green. Manganese produces an orange tinge. Sulphides of cobalt, nickel, iron, and silver diminish the phosphorescence.

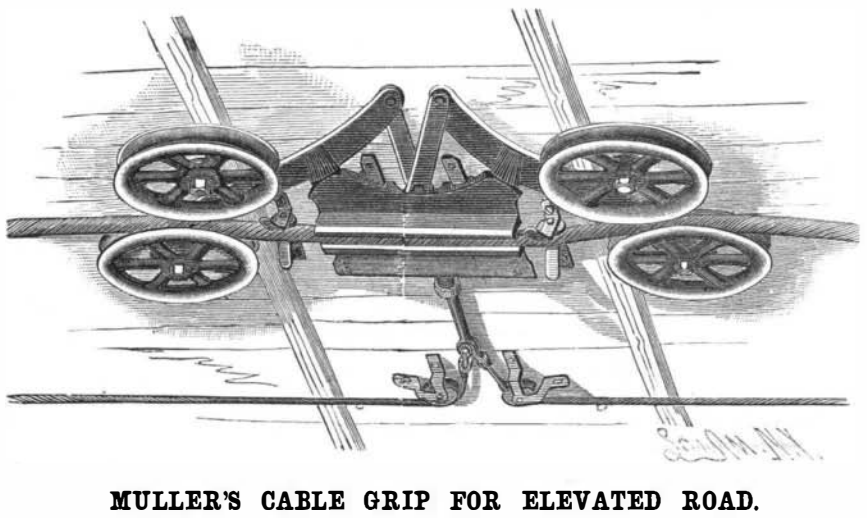
THE first use of a locomotive in this country was in 1829.

IMPROVED AUTOMATIC CABLE GRIP.

This grip consists essentially of two levers pivoted so as to form short and long arms. Upon the end of each short arm is loosely mounted a grooved pulley, and to the ends of the long arms are attached ropes or chains that pass around a sprocket wheel on the lower end of a vertical shaft located on the end platform of the car. This shaft is provided with the usual hand wheel, by means of which the levers may be operated. Placed opposite, but not in a direct line, to the movable pulleys are two others, similar in every respect, except that they have no movement toward or from the cable which passes between each pair. Placed between each set of pulleys is a gripping jaw, formed of one immovable and one movable plate, both of which are longitudinally grooved along their facing edges to receive the cable. The movable jaw is operated by the two levers, but it is not moved sufficiently far to secure a grip until after the pulleys have firmly taken hold.



MULLER'S CABLE GRIP FOR SURFACE ROAD.



MULLER'S CABLE GRIP FOR ELEVATED ROAD.

It will be seen from this construction, the extreme simplicity of which is apparent, that when the pulleys first come in contact with the moving cable, they will turn on their spindles until the pressure exerted by the levers is enough to clamp the cable, which will then carry the car along with it. The further movement of the levers causes the jaw to firmly grip the cable. There are thus two separate holding forces brought to bear upon the cable—the first a rolling contact between the rope and pulleys, and the second a direct grip of the jaws. It will also be seen that when the gripping jaw is released, the pulleys will grip the cable sufficiently, allowing the car to travel at a less speed than that of the cable, at the will of the gripman, which at times is necessary in a crowded thoroughfare, to avoid accidents. This combination prevents any excessive wear on the cable, and at the same time forms a reliable and easily operated grip. When the grip is open, the lower pulleys are so placed that they will also act to support the cable. The pulleys are not subjected to great continuous strain, since they merely serve to start the car, the jaw then sustaining all the strain. The holding power of each pair of pulleys is practically augmented by reason of their being placed at such an angle with the cable as to slightly bend it. One of the engravings shows the grip arranged upon a vertical frame, secured to the bottom of a car, and passing through the slot in the ordinary trench, while the other shows the grip placed horizontally and attached directly to the car bottom.

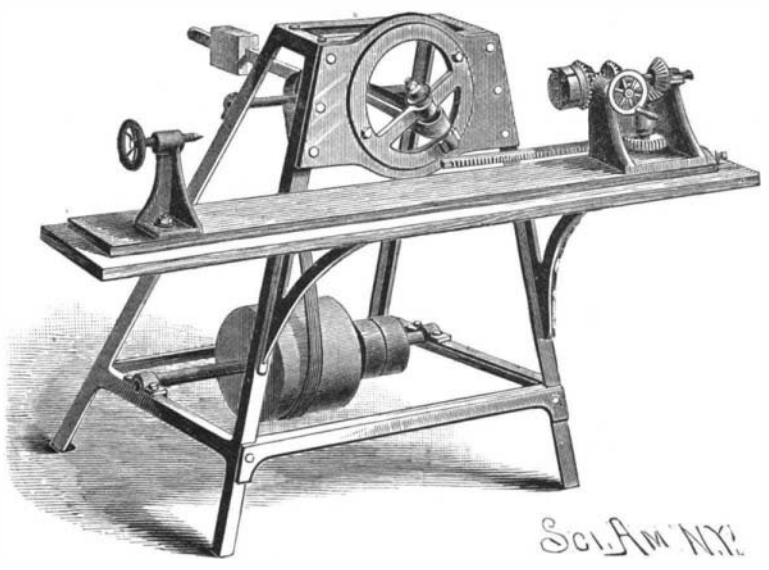
Further particulars regarding this invention can be obtained from the patentee, Mr. George Muller, of Hoboken, N. J.

LATHE FOR TURNING SPIRALS.

This machine is adapted for cutting spiral twist mouldings or forms on the exterior surfaces of turned work, such as stair balusters, newel posts, and the like, whether it be cylindrical, or tapering, or curved, and irrespective of the diameter or length of the work. The frame of the machine is made with a vertical front, to which the face plate is fixed. Fitted snugly, but movably, to the face plate is a frame, in which is journaled the spindle carrying the cutters, which may be formed to work beaded, fluted, or other forms in spiral twists of any pitch on balusters or posts. The spindle may be set at any desired angle with the horizon by turning the frame, but the cutters will always operate at the center or axis of motion of the cutter frame. The spindle is driven by a belt passing over a tightener, and leading to tight and loose pulleys on a shaft driven in any convenient way. The main workbed of the machine is fixed to brackets secured to the main frame, and the carriage holding the head and tail stocks is laid loosely on the bed. The tail stock may be freely swung on the bed to carry the work to and from the cutters, and, at the same time, the carriage is free to be moved along the bed, to feed the work along in front of the cutters. The head stock is fixed to the carriage, while the tail stock is adjustable along the carriage to accommodate the length of the work. In the head stock is journaled a live spindle, which holds one end of the work. On the inner end of a shaft journaled at right angles to the spindle is fixed a beveled pinion, which meshes with a gear fixed to the head block. At the outer end of the shaft is a hand wheel, by turning which, motion is imparted to the spindle and its connected parts.

On the spindle are placed two beveled pinions, either of which may be engaged by a gear fixed to a vertical shaft journaled to a cross bar of the head stock, and to the lower end of this shaft is fixed a gear wheel, which engages with a rack bar held to the bed in such a manner that it may be adapted to engage gear wheels of different sizes, to govern the speed of rotation of the spindle and work, in accordance with the diameter of the work and the pitch of the spiral mouldings to be cut. Operating the hand wheel with the right hand causes the work to be turned and the carriage to be moved forward, while the left hand is free to press the work to the centers by pushing the carriage inward.

After the first spiral cut has been made in the work, from the head stock toward the tail stock, the carriage is swung backward to carry the work away from the cutters, when a dividing wheel on the spindle is turned around a distance of one or more notches and held by a latch. The work is then fed along the cutters for making the second spiral; this is repeated as many times as may be necessary to go around the work. It will be seen that spirals may be cut upon tapering work for the whole or any part of its length, and upon cylindrical or curved work. By properly arranging the cutter spindle and turning the hand wheel in the reverse direction, left hand mouldings may be cut.



WOOD'S LATHE FOR TURNING SPIRALS.

This invention has been patented by Mr. George Wood, of 4724 Main Street, Germantown, Philadelphia, Pa. Further particulars may be obtained from the inventor or from Mr. William Hacker, of 170 Wistar Street, same place.

Government Payments for Oil.

The Treasury Department has awarded contracts for supplying oil for the use of the lighthouse service as follows: For mineral oil, to the New York Refining Company, at 6 35-100 cents per gallon; for lard oil, to be delivered at the depot on Staten Island, to Armour & Co., of Chicago, at 50 cents per gallon; for lard oil, to be delivered at San Francisco, to Yates & Co., of San Francisco, at 54 cents per gallon. These prices are much lower than formerly paid.