

The Foote Intermediate Speed Regulator.

This apparatus is designed for use on line and counter shafting, to equalize the power delivered by the engines, water wheels, and electric motors; insuring, it is claimed, an absolutely unvarying speed to electric generators, or other purposes where a very steady and uniform revolution of shafting or machinery is desired. The manufacturers especially recommend the device in electric railway works, where the variations of load are so great, causing the engines to run either above or below their nominal rated speed as the load may be greater or less, as the case may be. One application of this device, which is of special interest, is its use in connection with water wheels. It is a well known fact that there is not a satisfactory governor for water wheels in existence; and with changing loads and different loads of water it is impossible to obtain the required uniformity and regularity of speed demanded in

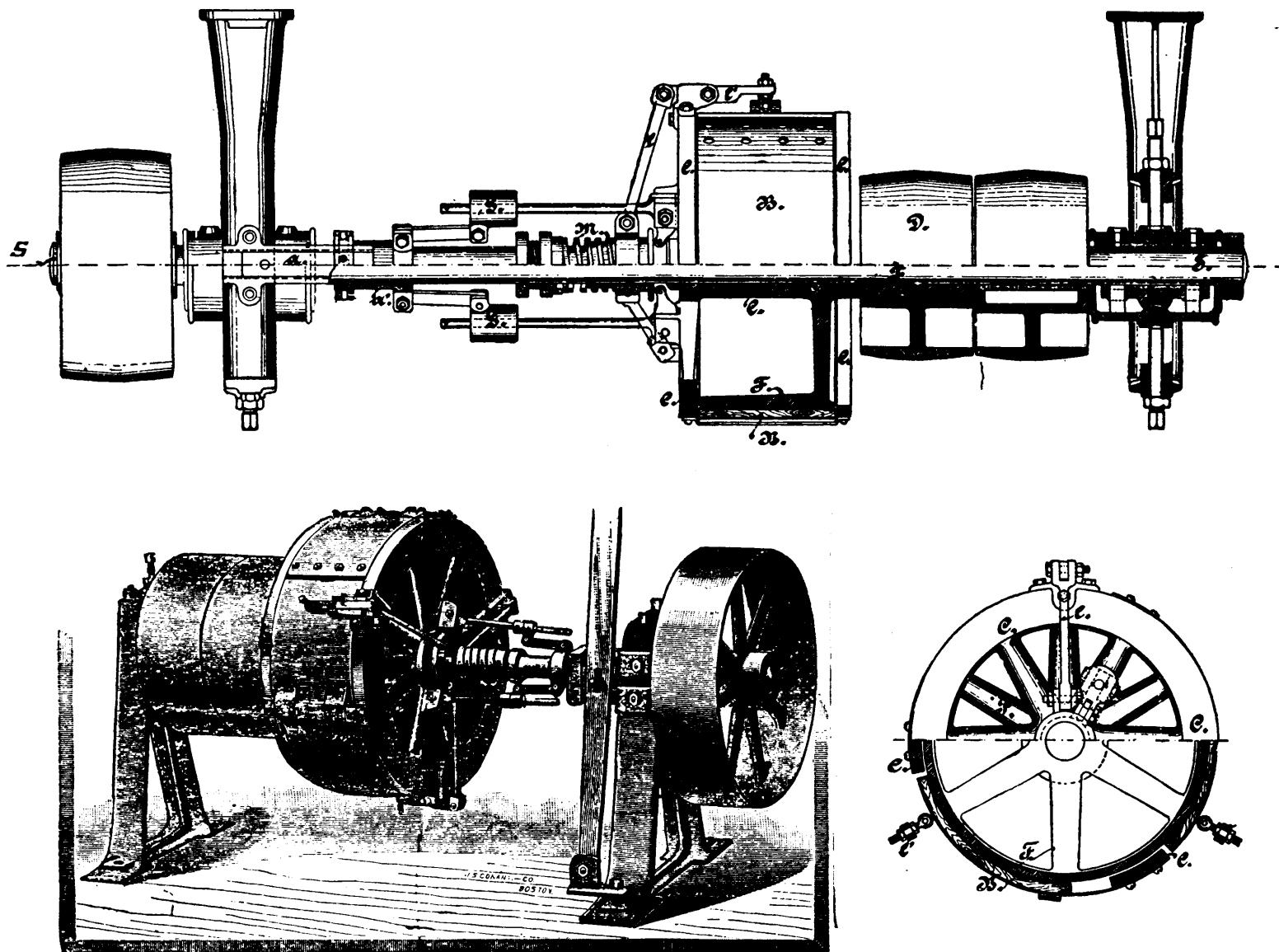
dynamos and electric generators. Water power promises to become an important factor in electric railway works, because of the possibilities of transmission which makes available power, which is in some cases to be obtained at a very small expense.

The description of the regulator as shown in the sectional view is as follows: The main features are a friction coupling between a driving pulley and the shaft to be driven, and a governor which regulates the amount of pressure on the friction surface. As shown, the apparatus is in the form of a countershaft, D is the driving pulley, and is keyed on a projecting sleeve to which are attached the bands bearing on the friction wheel, and forming one portion of the machine. When the friction surfaces are not in contact, it is free to revolve independent of the shaft S S.

The brake shoes B, which are made of leather, backed by wood and sheet steel, are brought in contact with

the friction wheel by the spring M, which acts through the levers L and L', which have their fulcrums on the carrier C, which is fast to the shaft S S. The arms of the governor G G at their fulcrums have an extension at right angle, which presses against the spring M, diminishing the pressure brought to bear on the brake shoes through the medium of the levers L and L'.

The tension of the spring M and weights on the arms of the governor are determined and adjusted according to the speed and powers required. It is understood that the speed of the driven D is somewhat in excess of the speed required for the shaft S S. The arms and weights of the governor when in revolution fly outward, owing to the centrifugal force and compress the spring M to such extent as will allow of the proper amount of friction to give the desired speed. Chandler & Wittlefield, Room 40, Marine Building, Chicago, are the general Western agents.



Pit-Shafts in American Collieries.

Mr. W. S. Gresley, M.E., in his notes on Coal and Coal Mining in North America, states that he only knows of one circular or even oval shaft, and this is in the northern district of the anthracite coal-field. Shafts are invariably made rectangular in the States. Why, the writer cannot now discuss. Brick or stone walling is never used, but timbering from top to bottom. We can only recollect coming across one single case of an arched inset or pit bottom. Wet ground is secured with solid timber cribbing, and a wall of cement is often formed behind it several feet thick. The longest shafts the writer knows are 12 ft. by 53 ft. in the clear by 1,060 ft. deep; another (just completed) is 14 ft. by 48 ft. by 1,160 ft. deep. These are anthracite shafts. They are divided into six compartments, viz.:—Four cageways (for two pairs of winding engines), a pump division, and an air or fan compartment. Three or four compartments, however, are usual—namely, two for cages, one for fan, (bratticed off of course), and one for the pumps. Double deck cages are never used, and one tub or car only is hoisted at a time, but the capacity of the cars is very large, from 1 ton in thin seams to 4 tons, or say, 160 cubic feet in thick workings. Steam locomotives are often employed for hauling trains on the main roads, along tunnels (drifts, stone headings, cruts, etc.), and on surface between pit-tops, mouths of inclines or footrills, called "slopes" here, and the "breakers," a breaker being a huge timber building containing crushing and screening and washing machinery for preparing the anthracite for market. These locomotives are of the saddle-tank type, and usually have 9 in. cylinders by 14 in. stroke, and weigh 8 to 9 tons in

running order. They are considered equivalent in effective work to from fifteen to twenty large mules, according to varying conditions of work and place. The gauge of track is from 3 ft. to 4 ft. From ten to twenty-five cars are hauled per trip, equal to from 25 to 100 tons load. Coal is the fuel consumed. Average speed about six miles per hour. The air is, of course very much vitiated where locomotives are used, but their use is restricted to places where foul air is passed direct to the returns. Electric locomotives and rope haulage are gaining favor gradually.

Foaming in Boilers.—When boilers are new and first used, they are liable to foam, in consequence of grease or oil left in them during their manufacture. The simplest remedy for this is to put from one-half to one pound common washing soda in the boiler when first filled with water. After steam has been raised and the soda has neutralized the oil and grease, draw the fires, and when the pressure of steam has become reduced to not exceeding five pounds, blow out of the boiler, then fill with fresh water, adding a very small quantity of soda to neutralize any grease remaining within the boiler. The general cause of boilers foaming is using the steam faster than the fires are generating it, as any boiler can be caused to foam by drawing the steam from it faster than it is generated. The remedy in this case is to close the throttle so as to reduce the quantity of steam discharged in proportion to the amount being produced, increase the fire so as to make more steam, and the quantity available for service will be in accordance, without danger of foaming. The steam gauge is a valuable guide in this matter. The more dirty the water becomes, the greater necessity of attention to

the fire, as dirty water will not produce steam so readily as cleaner water.

Cheapening of Aluminum.—Mr. Eugene H. Cowles, President of the Cowles Electric Smelting & Aluminum Co., of Lockport, stated that their new process of electric reduction of pure aluminum directly from the ore has reached such a stage as to enable them to produce metal, 98 per cent. pure, at a cost of \$1.25 per pound. It is proposed to utilize the entire Lockport plant for the production of aluminum by the new process, and the capacity of the works is estimated at from ½ to ¾ ton per day. The production of aluminum in alloys of iron and copper will be abandoned at these works.

Mr. Benjamin Ford, boiler inspector, Pittsburgh, Pa., has just patented a device which has considerable promise. He proposes to replace the present style of boilers by a tubular steam generator, which will use common coal slack for fuel; which occupies about half the space required by ordinary boilers; costs about 25 per cent. per horse-power less; almost perfectly consumes all smoke, and the worst accident that can happen it will be a rupture of one of the tubes, which can be replaced quickly and at small cost by any mechanic. The fire is directly applied to the series of tubes containing water. There is no outer shell to explode; the compactness, portability, economy of fuel and perfect safety of this invention will at once recommend it to the manufacturers and users of steam. Mr. Ford's life-long experience and study of steam power guarantee the practicability of the new apparatus.