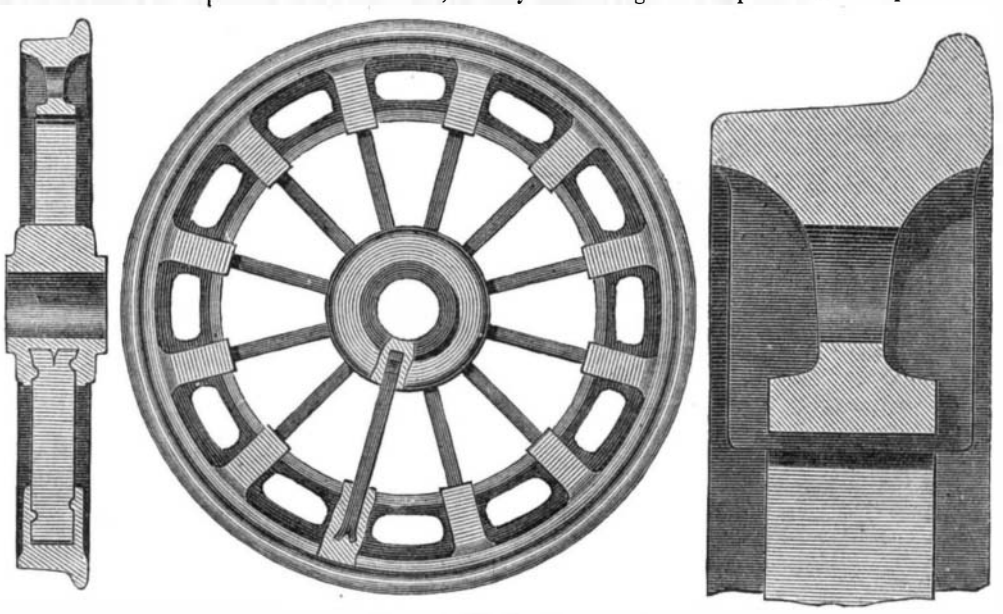
NOTES FROM THE VIENNA EXPOSITION.

LEATHER MANUFACTURES.

The display of leather and leather goods at the exposition is very large, and many countries are represented. Turkey has a fine representation of leather articles in great variety, also Austria, France, and the German states. The American display is small; but the exhibition of hand and machine sewed boots and shoes, from Lynn, Mass., is declared to be the best of anything of the kind in the exposition.

LUDWIG'S RAILWAY WHEELS.

We illustrate, herewith, a somewhat novel construction of chilled cast iron railway wheels with wrought iron spokes, of which a pair are exhibited at Vienna from C. I. Bergmann's foundery and iron works, of Graz, Styria. These wheels, which have been designed and patented by Mr. Ludwig, the manager of the above works, are intended as substitutes for the chilled cast iron disk wheels in use to some extent on Austrian and German railways, and their construction will be readily understood from our engravings. The rim is cast in a chill, and from its form it can, without risk, be cast of harder iron than is usually employed. The rim and boss are connected by wrought iron spokes, as shown, and the wheel is stated to be capable of being broken only with great difficulty. One hundred and sixty pairs of these wheels have already been running about a year on the Graz-Koflacher railway, and they are stated to have given good results. We are indebted to *Engineering* for the illustration.



LUDWIG'S RAILWAY WHEELS.

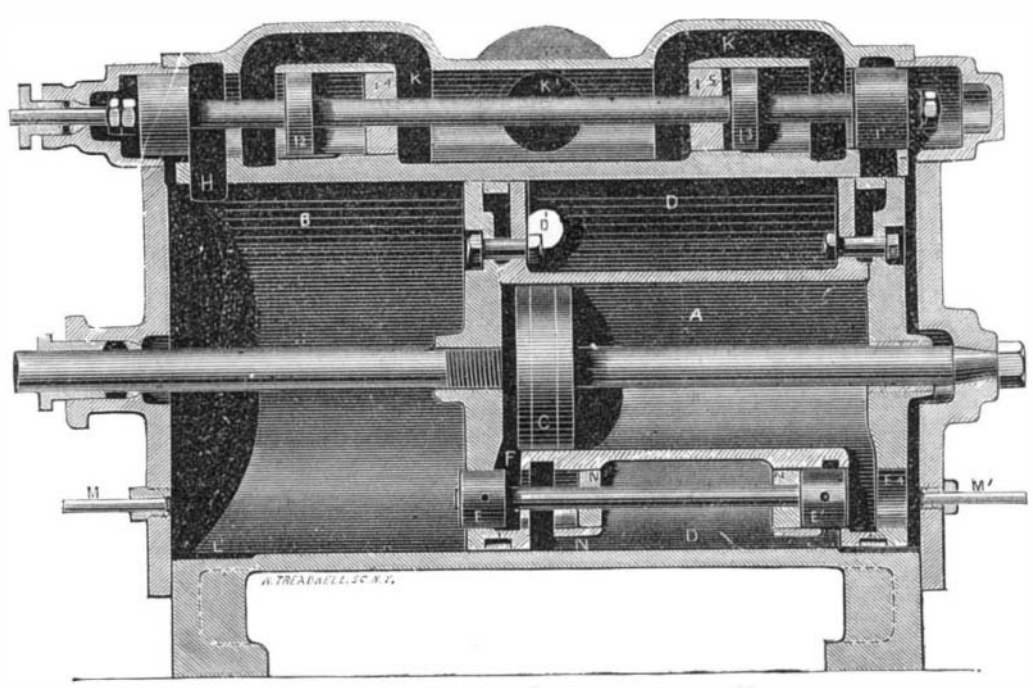
NEW COMPOUND ENGINE.

Messrs. Edward Field and F. M. Cotton, of Chandos Chambers, Adelphi, London, England, exhibit a model of a direct expansion compound engine, of which we give an illustration from *Engineering*. The arrangement consists essentially of a high pressure cylinder placed within the low pressure cylinder, and moving backwards and forwards upon a fixed piston; the annular space around this high pressure cylinder is always filled with steam direct from the boiler, which passes into the cylinder through the ports on the lower side, the admission being regulated by the piston valves shown in the engraving. By means of these valves, also, the steam from the smaller cylinder enters the low pressure cylinder, while at the end of each stroke a small quantity of steam passes from the annular reservoir into the low pressure cylinder, to serve as a cushion and to move the valves. Piston valves, on the top of the low pressure cylinder, regulate the communication between it and the exhaust.

In the section, A is the high pressure cylinder, the flange and covers of which serve as a piston to the low pressure cylinder, B; the fixed piston is shown at C′, and D is the annular high pressure steam chamber or reservoir in direct communication with the boiler by the pipe, D′, surrounding the cylinder, A, and moving with it. The piston valves belonging to this cylinder are shown at E E′, and are connected by a spindle, I^4 I^5. They work in cylindrical passages bored out of the lugs, N N′, and cushions, M, are introduced as shown to receive the blow from the valves at the end of each stroke. The valves for opening and closing the exhaust of the low pressure cylinder are shown at I I′: they are also connected by a spindle, and cushions similar to those just mentioned are provided at I^4 I^5, for the cushioned valves, I^2 I^3, to strike against. The exhaust opening is shown at K′. At each end of the low pressure cylinder is formed a small groove, L and L′, which admits steam from the annular chamber into the low pressure cylinder at the end of each stroke, for the purpose of throwing over the valves, E E′, and of forming a cushion for the moving high pressure cylinder. Small spindles, I, M and M′, are provided, the former at the end of the exhaust valve chest, and the latter at each end of the low pressure cylinder, in a line with the center of the valves, E E′, in order to move the latter if necessary.

Taking the position of the high pressure cylinder at the end of its stroke, as shown in the section, it will be seen that the valves, E E′, are thrown forward, so that steam from the annular chamber is admitted through the port, F, to the forward side of the fixed piston, C; at the same time the motion of the valve, E′, has opened the exhaust port of the cylinder, A, the steam from which passes into the low pressure cylinder. But before this takes place it is necessary to move the valves, E E′, which is effected as follows: The cylinder, A, in coming to the end of its stroke, passes over the small grooves, L, before mentioned, and admits steam from the annular chamber, D, which, passing into the small space in the low pressure cylinder, behind the end of the high pressure cylinder, acts at once upon the back of the valve, I′, which it throws over, opening the communication between the low pressure cylinder and the exhaust, and also upon the valves, E E′, which are moved into the position shown in the section, Fig. 1. The steam from the chamber then passing into the cylinder, A, and that from the same cylinder being exhausted into B, both act simultaneously in the same direction.

The arrangement just described and illustrated is adapted especially for working pumps direct, and steam is admitted into the high pressure cylinder during the whole of its stroke. By a modification, however, the engine may be connected to a crank shaft, and any desired degree of expansion obtained. The proportion between the cylinders is five to one.



FIELD & COTTON'S COMPOUND STEAM ENGINE.

THE GREAT RUSSIAN NAVAL GUN.

In the matter of great guns and other ordnance, it seems to be admitted that the Russians take the palm at Vienna, The great Russian naval gun is one of the largest breech-loaders ever made. It weighs forty tuns, and cost sixty-seven thousand dollars. It is made entirely of cast steel. The bore is 12 inches, and the core is composed of a solid tube, 29 inches in diameter at breech, tapering towards the muzzle, the tube being reinforced by steel rings shrunk upon it and upon each other, four layers of rings being used; the entire diameter of the gun at the powder chamber being a little more than 4 feet 9 inches. In the rifling there are thirty-six grooves. The charge of powder is 113 lbs., the expected initial velocity of projectile 1,398 feet per second. The gun has not yet been fired. It is designed for service on the war ship Peter the Great.

IT is proposed to turn our Alaska possessions to account as penal settlements

Interesting Electrical Experiments.

At a recent soiree of the Royal Society, Mr. Willoughby Smith's discovery of the effect of light upon the resistance of selenium was illustrated experimentally by Mr. Latimer Clark. A piece of selenium was inclosed in a test tube connected at each end to platinum wires, and the tube was placed in a box with a sliding cover so as to admit any desired quantity of light. The resistance was balanced on a Wheatstone bridge, and with the aid of a Thomson galvanometer; the movement of the spot of light of course would follow any variation in the resistance of the selenium. With the box closed, the resistance of the selenium remained constant; but immediately the box was opened, the light index upon the scale began to move.

Another very interesting experiment was shown by Mr. Tisley, to prove the effect of magnetism upon ordinary electrolytic action. Water being decomposed in the ordinary manner, the gases were at once set free; but on connecting the electrodes of the battery with an electro-magnet, the gases commenced to revolve around the magnetic poles. A small bath was placed over the magnet, the bath itself forming one electrode and a plate, in the acidulated water of the bath, the other electrode. When the coil was magnetized, the evolved gases immediately commenced to revolve round the center plate at considerable speed.

Electrical Transmission by Cables.

As the first application of current to a cable is to charge it, it is evident that, before any employable electricity can issue from the further end, the corresponding charge must be completed. We may therefore assume that the time required by a wave to charge a cable, and the retardation on the time required for a wave passing from one end to the other to reach a given amplitude, are identical. Mr. Varley is of opinion that the electric current commences flowing out of one end of a cable at the very instant that contact is made with the battery at the other end, but that it is a considerable time before it reaches an appreciable strength; that it then goes on augmenting in strength, never absolutely attaining its maximum force. This may be so; but whatever the nature of electricity may be, it is difficult to imagine the total absence of inertia to its propagation. It is more probable that the velocity of electricity is the same in all conductors, whether submarine or overhead, or in any other form, and that it is very great, but that the resistance and induction of the circuit combine to prevent the wave reaching an appreciable strength for some time after it has commenced to flow out. This is a question, however, which can never be settled experimentally, because we can only recognize the issuing wave after it has attained strength enough to perform some mechanical effect.—*Robert Sabine, C. E., in the Telegraphic Journal.*

Scientific Immortality.

No doubt, says F. Papillon, there is no contradiction in conceiving of a perfect equilibrium between assimilation and disassimilation, such that the system would be maintained in immortal health. In any case, no one has yet even gained a glimpse of the modes of realizing such an equilibrium, and death continues, till further orders, a fixed law of Fate. Still, though immortality for a complete organism seems chimerical, perhaps it is not the same with the immortality of a separate organ in the sense we now explain. We have already alluded to the experiments of M. Paul Bert on animal grafting. He has proved that, on the head of a rat, certain organs of the same animal—as the tail, for instance—may be grafted. And this physiologist asks himself the question whether it would not be possible, when a rat, provided with such an appendage, draws near the close of his existence, to remove the appendage from him, and transplant it to a young animal, which, in his turn, would be deprived of the ornament in the same way in his old age in favor of some specimen of a new generation, and so on in succession. This tail, transplanted in regular course to young animals, and imbibing at each transference blood full of vitality, perpetually renewed, yet ever remaining the same, would thus escape death. The experiment, delicate and difficult, as we well see, was yet undertaken by M. Bert, but circumstances did not allow it to be prolonged for any long time, and the fact of the perpetuity of an organ, periodically rejuvenated, remains to be demonstrated.

THE Great Eastern finished laying the new cable on June 27.