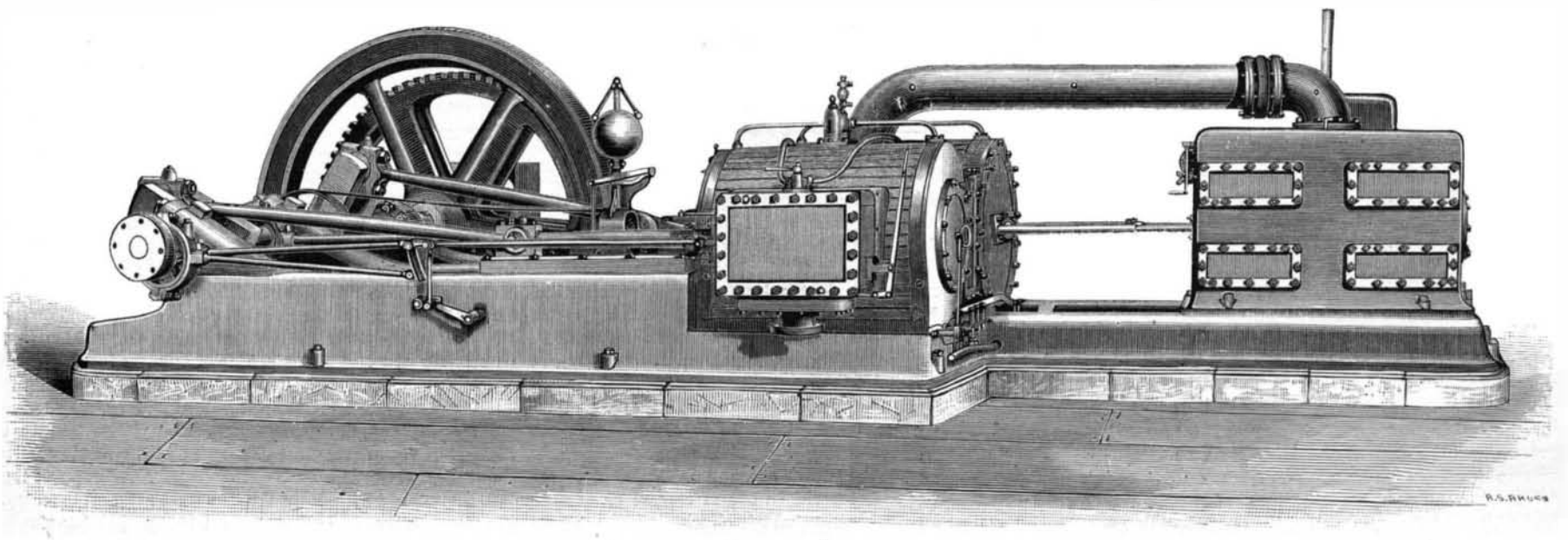
HORIZONTAL COMPOUND ENGINE.

We take from *The Engineer* the annexed engravings of a horizontal compound engine of excellent design, manufactured by the Avonside Engine Company, Bristol. The engine was one of the objects which secured the interested notice of many of those who visited the company's works during the recent meeting of the Institution of Mechanical Engineers in Bristol. It is provided with automatic expansion gear in the form of a link, operated by the governors, which are of Widmark's split ball type, and which are very sensitive in action. The crank shaft ends at a short distance from each bearing with a face coupling disk, the short piece carrying the fly wheel being fixed to a similar coupling disk to that seen in the upper view. It will be particularly noticed that the wall box supporting the fly wheel and main spur wheel bearing is of such form as to be capable of also embracing the pinion bearing. The two wheels are thus maintained with the proper distance between their centers, and the connection of the two bearings, thus in one wall box, makes a sound job not easily otherwise obtainable.



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The principal dimensions of the engine are as follows: Diameter of high pressure cylinder, 18 inches; diameter of low pressure cylinder, 34 inches; stroke of pistons, 3 feet; diameter of air pump, 9½ inches; stroke of air pump, 3 feet; diameter cold water pump, 6 inches; stroke cold water pump, 3 feet; double acting; working pressure intended, 60 lbs.; number of revolutions, 50 per minute.

Phosphate of Potash a Cure for Scurvy.

It is well known that an exclusive diet of salt provisions endangers scurvy, and that at sea or on expeditions where only such provisions can be carried over long periods of time, their injurious effects are prevented by drinking lime juice. Professor Robert Galloway has recently advanced the suggestion that phosphate of potash is a much better preventative of the malady, and at the same time that salt increases the nutritiveness of salted meat, so that he proposes in all cases where such meat is consumed that the phosphate be used as a condiment, the same as chloride of sodium is now employed. Professor Galloway points out that of the different substances which enter into the formation and constitution of the meat some are removed by the immersion of the same in brine, and the principal material thus extracted is phosphate of potash. It is evident, therefore, that if this salt was indispensable to the formation of fresh meat its absence in salt meat must be prejudicial.

The use of phosphate of potash as table salt is strictly analogous to the present employment of chloride of sodium, the latter being consumed and the taste requiring its consumption in order that it may be supplied as needed for the normal formation of the blood. Now, as salt meat lacks potash salts, and as the latter are useful in the formation of the fluids in the meat, it is as logical to use this substance as it is to use common salt. Furthermore, MM. Pasteur and Mayer have demonstrated the importance of phosphate of potash in nutrition, and have shown it to be indispensable to the development of the beer yeast cellule. Professor Galloway also considers that the beneficial effect of lime juice as a preventative of scurvy is due to the presence of potash and phosphates in it. If his views are correct, the discovery is of considerable importance, as phosphate of potash in the small amount needed can be transported with much greater facility and obtained more inexpensively than lime juice, while at the same time it increases the nutritive value of the cheap salt provisions now largely consumed by the poor.

Poisoning by Burning Gas.

The *Lancet* urges the inconvenience, and even danger, of the ordinary burning gas. It says:

"To have our rooms pleasantly illuminated with gas is to undergo a process of poisoning, the more disastrous because, instead of directly producing the characteristic symptoms of defective blood oxygenation, the gas-polluted atmosphere insiduously lowers the tone of vitality, and establishes a condition favorable to disease. It would be difficult to overrate the importance of this household peril. Pictures are spoiled by gas, gilt mouldings are tarnished, the colors of decorated walls and ceilings fade, and men and women of delicate organization are enfeebled and injured by the foul air in which gas is discharged and supposed to burn innocuously. The extent to which this evil works in the midst of domesticated families during the long evenings is not adequately appreciated After the first few unpleasant experiences are over, the physical insensibility becomes inured to the immediate results of breathing an atmosphere charged, more or less heavily, with the products of combustion and unconsumed coal gas. It is not creditable to the ingenuity of practical men that no method has yet been devised by which the advantages of gas as an illuminating agent may be secured without the drawback of slow poisoning, with the host of maladies a depressed vitality is sure to bring in its train."

Steel for Shipbuilding.

The British Admiralty tests at present for steel are as follows:

TENSILE AND EXTENSION TESTS.

1. Strips cut lengthwise or crosswise of the plate to have an ultimate tensile strength of not less than 26, and not exceeding 30 tons per square inch of section, with an elongation of 20 per cent in a length of 8 inches.

TEMPERING TEST.

2. Strips cut lengthwise of the plate 1½ inches wide, heated uniformly to a low cherry red, and cooled in water of 82° Fah., must stand bending in a press to a curve of which the inner radius is one and a half times the thickness of the plates tested.

3. The strips are to be cut in a planing machine, and are to have the sharp edges taken off.

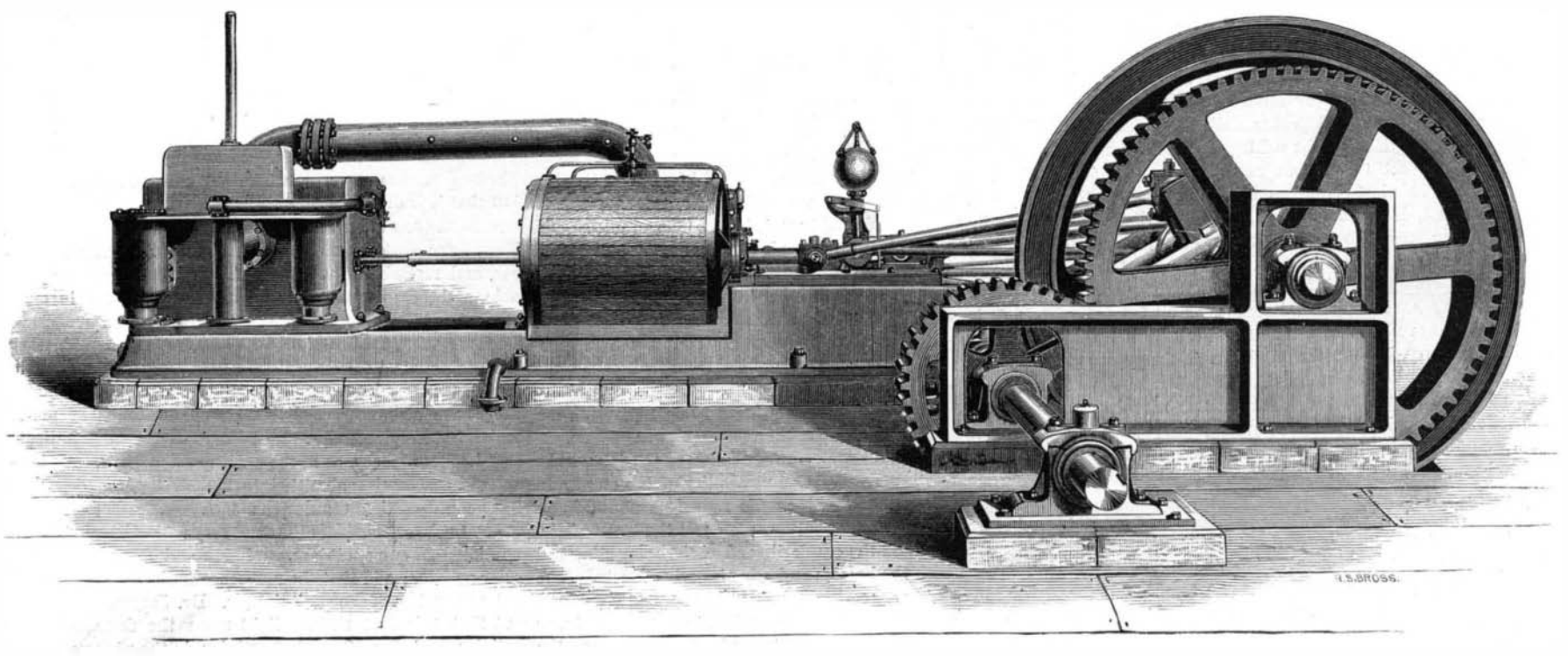
4. The ductility of every plate is to be ascertained by the application of one or both of these tests to the shearing, or by bending them cold by the hammer on the contractor's premises, and at his expense.

5. All plates to be free from lamination and injurious surface defects.

6. One plate to be taken for testing by tensile, extension, and tempering tests from every invoice, provided the number of plates does not exceed fifty. If above that number, one for every addition of fifty, or portion of fifty. Plates may be received or rejected without a trial of every thickness of the invoice.

7. The pieces of plate cut out for testings are to be of parallel width from end to end, or for at least 8 inches of length.

When the plates are ordered by thickness, their weight is to be estimated at the rate of 40 lbs. per square foot for plates of 1 inch thick, and in proportion for plates of all other



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thicknesses; the weight so produced is not to be exceeded, but a latitude of 5 per cent below this will be allowed for rolling in plates of half an inch in thickness and upwards, and 10 per cent in thinner plates.

These weights may be ascertained by weighing as much as 10 tons at a time.

TESTS FOR ANGLE, BULB, OR BAR STEEL.

The whole of the steel to stand a tensile strain of 26 tons to the square inch, and not to exceed 30 tons to the square inch. Also to stand the extension and tempering tests described for plate.

All the cross ends to be cut off. One bar is to be taken for testings from every invoice, providing the number of bars does not exceed fifty; if above that number, one for every additional fifty, or portion of fifty.

IMPROVED PROTECTED NON-RECOIL GUN.

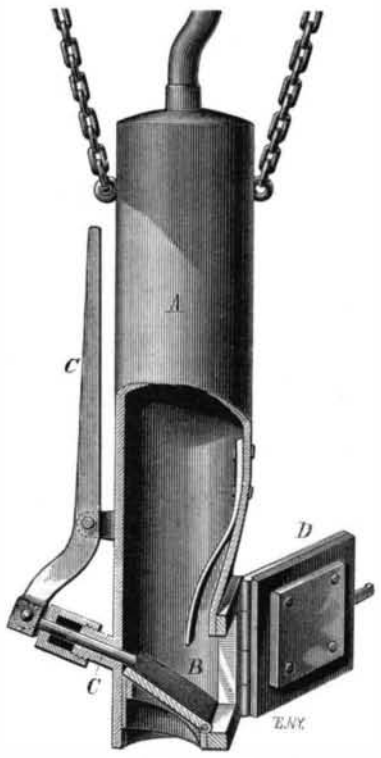
We are indebted to the *Engineer* for the annexed engraving and accompanying description of this invention. The object of the system is the complete protection of the gun detachment and of the gun itself, except at the muzzle. It is also supposed to insure accuracy of aim for a continuous series of rounds. The general idea is that the gun shall pivot at the muzzle in a ball and socket joint, fixed into the armour of a casemate, entirely closing the port and preventing recoil. Krupp claims that when once the gun is laid true on the object, it can be fired any number of times without recoiling, jumping, or otherwise changing its position or direction in the least; so that all error in shooting due to inaccuracy of laying is prevented when once the right direction is secured.

The drawing, Fig. 1, shows a section of a casemate for a 6 inch gun. The muzzle is enlarged to form a ball, A, which plays in a socket consisting of a steel port plug, B, into which is screwed a wrought iron cylinder, C, holding the ball of the muzzle firmly in the socket. On each side of the gun, trunnion, D, travels up and down a carrier, E, in which a slot is cut for the purpose. This carrier is fitted with a hollow soled truck, F, which permits the carrier to pivot on the racer, G, and so to accommodate the arc traveled through by the trunnion, when elevation is given, to the straight slot in the carrier. The truck also moves along the racer, G, when the gun is traversed. The casemate is composed of a thick wrought iron plate, H, in front, supported by strong box girders, K, and roofed with thin wrought iron plate, I. The lower portion is made of cast iron, J. It is protected from the enemy's fire by a glacis of concrete, L, in which is embedded a wrought iron glacis plate, M. A wrought iron shield, N, covers the muzzle of the gun when not firing. It rests on a trigger, O, so that when the gun is ready to be fired, the rope draws back the trigger and the shield falls. As soon as the gun is fired the shield is raised by the winch, P, acting in aid of the balance weight, Q, and the trigger is forced back to its place as a support by the spring, R. The sides of the casemate are built as of brick covered with wrought iron plates. They are all sloped as shown in Fig. 2 to cause shot to glance off.

IMPROVED PNEUMATIC DREDGING TUBE.

Our engraving represents a new pneumatic tube for dredging, mining, and wrecking purposes, which is worked by creating a vacuum and drawing the sand, earth, or other matter into the same. A represents the tube which is connected by a rubber pipe at the top, with an air pump on the vessel or float.

The lower end of the tube, A, is provided with a hinged inclined valve, B, that is fitted by rubber packing, hermetically, to a seat, and locked rigidly, when the tube has been lowered to the bottom, by a sliding bolt or key, C, which is guided in a stuffing box and operated by a lever.



A discharge door, D, is hinged to the side of tube near the bottom valve. A spring, at the inside of the tube, above the side door, serves to cushion the bottom valve when the same is opened for drawing in the sand or earth.

After the tube has been lowered and placed into position on the bottom of the river, the bottom valve being closed, and the air pumped out by the air pump until a vacuum is created, the key is withdrawn by the lever, and the sand or earth drawn into the tube until the same is nearly filled. The tube is then raised, and the contents discharged by opening the side door, the inclination of the bottom valve facilitating the discharge.

THE German government contemplate introducing the telephone into the telegraphic service, and are about to begin experiments upon it.

Progress of the New York Elevated Railroads.

When the elevated railroad on the west side of New York city is completed the termini will be South Ferry and Eighty-first Street. The total distance will be then six miles. Foundations for supporting columns are now being put down between Sixty-first and Eighty-first Streets, and the foundations necessary for making the track double between South Ferry and Sixty-first Street will be completed in a few days. Two fifths of the road are finished for a double track. The gauge is the standard one, 4 feet 8½ inches, and the rails are Bessemer steel, 50 pounds to the yard. Rolling plant consists, at present, of 21 dummies and 39 passenger cars. The average number of passengers daily is 11,000. In 21 days of last month (November) there were 207,926 passengers against 139,768 in the same time of the corresponding month in last year, an increase of 68,157.

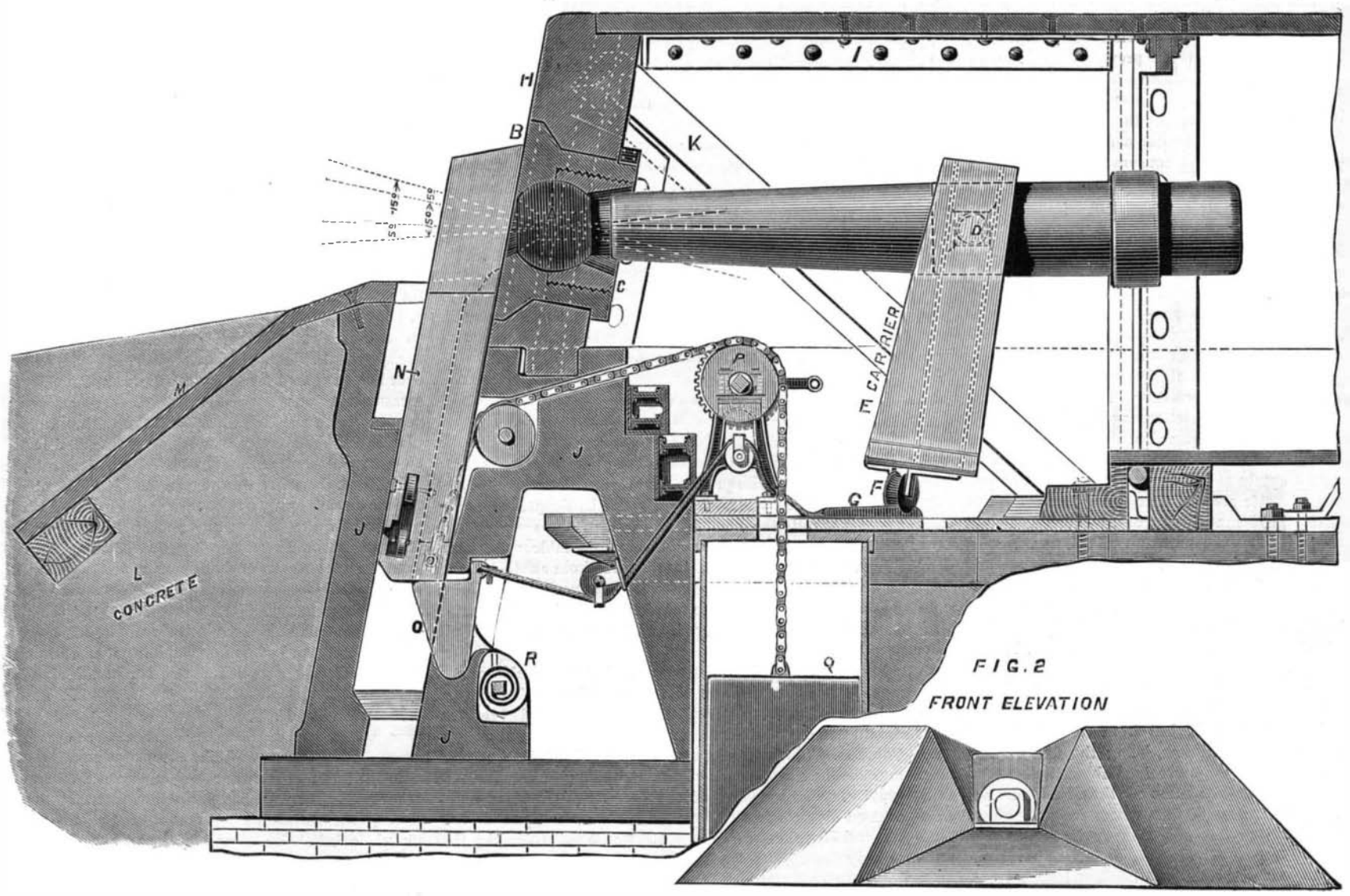
On the east side there will be a railroad from South Ferry to Sixty-first Street, having a double track all the distance. There will be branch roads: one to Fulton Ferry, another from Chatham Square to the City Hall and the end of the Brooklyn bridge, one to Thirty-fourth Street, and still another to the Grand Central Depot. The work on both sides of the city is progressing rapidly. An estimate of the cost by the chief engineer, for the double track on the east side of the city, from South Ferry to the Central Park at Sixty-first Street, 5 miles, with equipments, stations, and all the appointments necessary to its full operation, is $1,625,000, or $425,000 per mile. In this estimate is included sixty passenger cars, twenty-five dummies, eight stations to the mile, and engineering. The estimated numbers of passengers per annum is 14,700,000, and receipts, $1,250,000.

New Agricultural Inventions.

Ladore V. Sikes, of East Otto, N. Y., has invented an ingenious cider-mill. It has two curbs, which move on rails. While the ground fruit is being pressed in one curb, a grinding mill is filling the other. The cake in the first is then taken out and the full curb moved under the press. The curbs are thus alternately changed from the grinding mill to the press, and thereby the grinding and pressing of the fruit and the making of cider is accomplished quickly.

Joseph R. Palermo, of Gonzalez, Texas, has invented an improvement on Cotton Seed Planters by which the seed is more readily supplied to the endless belt of the hopper. By an ingenious device motion is communicated from the rear roller of a band to a crank to a rock post, and cross bar which works a curved wire inside the hopper thus keeping the seed well stirred up.

E. M. Wilcox, of Whitewater, Wis., has invented a check-row attachment for corn planters by which a field can be planted in accurate rows. At the end of a shaft which revolves in bearings attached to the hopper is fitted a chain wheel, the teeth of which mesh into the links of a chain extended across the field. By an ingenious combination of a cylinder, cam groove, shoe and bars, the wheel revolves and the chain marks out the check row. This is a very useful and convenient improvement.



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