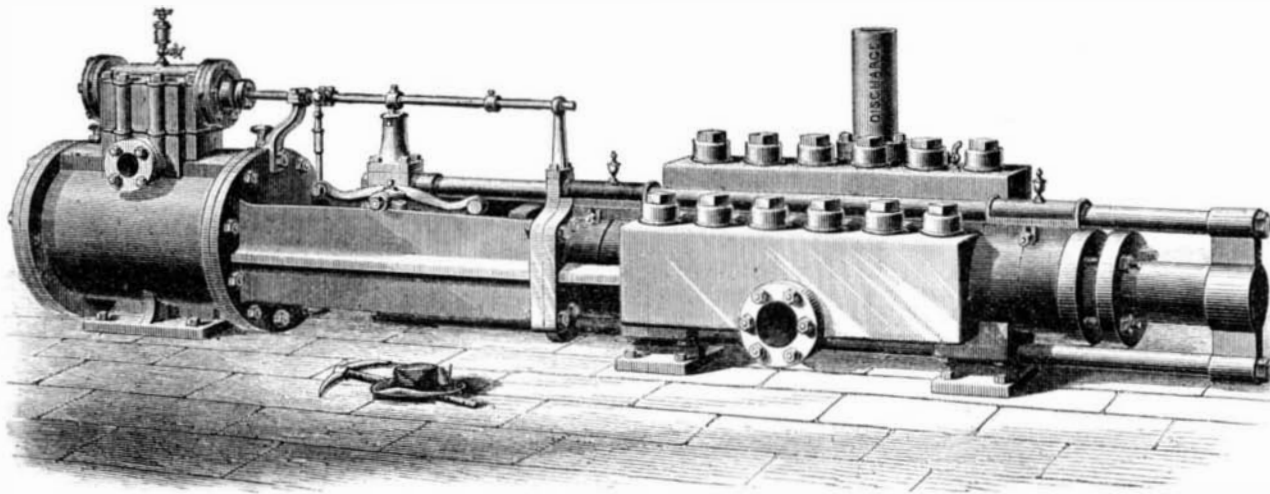


THE KNOWLES HORIZONTAL MINING PUMP.

An accidental interchange of the engravings illustrating our article on the Knowles steam pump, in our issue of January 8, exhibited a cut of a different style of pump from that intended to be described, in connection with so much of the description as relates to Fig. 6. The present illustration represents the correct double acting plunger pump referred to. The absence of joints at the water end is here clearly observable. The various parts are accessible, and there is a novel arrangement of valves, by which not only the valve, but also the valve seat, is instantly removable by simply unscrewing the cap nut. These pumps are now working on lifts equal to 1,600 feet vertical column without causing shocks or pounds of any description. Full details regarding the manufacture and trial tests of these excellent machines are given in the article above mentioned.



THE KNOWLES HORIZONTAL MINING PUMP.

STEAM HORSE FOR STREET RAILWAYS.

Mr. S. R. Mathewson, of Gilroy, Santa Clara county, Cal., has recently devised a new motor for street cars, an illustration of which is given herewith. The following description, by the inventor, will explain its operation: "The design is to make a machine resembling a horse in form, so as not to frighten the horses on the streets. To this end the form shown is chosen. The motive power is steam, generated in a tubular boiler of from four to five horse power, located inside of the horse and forward of the cab. This drives a rotary engine of my own patenting, which is geared to the driving shaft of the machine. I also propose the use of gas as fuel, so as to do away with smoke. The boiler is so constructed as to receive a supply of hot air to feed the flame, the gases from which, after passing around the boiler, are conducted around the engine to prevent loss by condensation. The water is forced into the boiler from the condensed steam chamber. The engine is provided with a brake capable of stopping the apparatus within a space of twenty feet, while under a speed of eight miles per hour."

The inventor points out that the engineer could easily control the machine, and also collect fares and perform other duties usually done by conductors. He claims that the cost of running the apparatus will not exceed one dollar per fifteen hours, that it may be very cheaply constructed,

and that its use would be productive of a very large saving to street car companies. He also states that the weight of the machine will be from 2,800 to 4,000 lbs., and that it will

run at from 4 to 20 miles per hour. A cow catcher is provided, and suitable devices arranged for attaching cars. A signal bell is fixed above the horse's head; and a lantern in front serves as a head light to give warning of its approach, when the machine is running on dark streets at night. For further information, address the inventor as above



MATHEWSON'S STEAM HORSE FOR STREET RAILWAYS.

(P. O. Box 110), or Levi Doane, Esq., San Francisco General Post Office, San Francisco, Cal.

The Type Writer.

At a recent meeting of the Society of Arts, London, a machine was exhibited, intended to enable persons to write, or rather print, without using a pen. The *Journal of the Society of Arts* says:

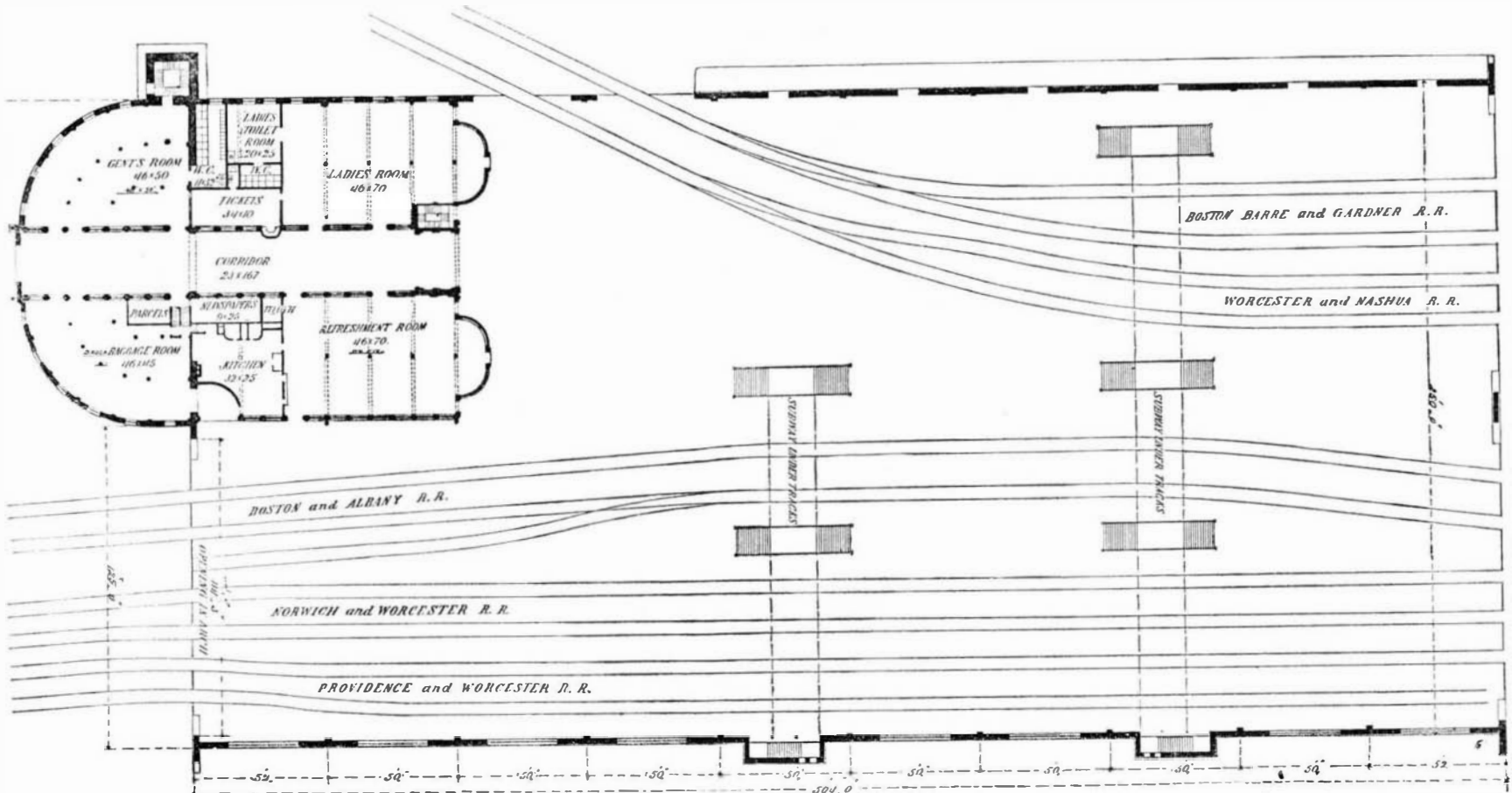
The machine in appearance somewhat resembles an ordinary sewing machine, being mounted on a stand of the size and appearance of a sewing machine stand. In front there is a keyboard with the letters of the alphabet, numerals, etc., upon it; and on pressing one of the keys, a small lever bearing the corresponding letter is caused to strike against a ribbon saturated with a prepared ink, over which the paper is held on a roller. Each letter strikes in the same spot, but the roller with the

paper moves a space forward after each letter, so that it appears on the paper in its proper place. The mechanism is very simple, the levers carrying the letters being actuated by a similar arrangement to that of a piano, and strung on a circular wire so that they all strike into the centre of the circle. By the action of a treadle, as soon as a line is finished, the roller is traversed back to its original position, and at the same time it is revolved one tooth of a ratchet wheel, so as to bring a fresh line under the operations of the apparatus. The type is all small capitals, and the printing is perfectly regular and even. It is stated that, after a little practice, any person can work twice as fast as an ordinary writer, and that a skilled operator can gain a very much greater speed. The machine can be used for manifold with the ordinary thin paper and carbon paper, some nineteen or twenty legible copies being obtainable. It is an American invention, and has been brought out in London by the Remington Sewing Machine Company.

[Our cotemporary is correct in stating that the improvement originated in this country. It is the invention of Mr. A. E. Beach, of the *SCIENTIFIC AMERICAN*, patented here in 1856, in which year the American Institute awarded its gold medal for the exhibition of the instrument at the Crystal Palace, this city. The invention is rapidly coming into use in all parts of the world. The original patent has expired. The machine as now made is very effective, and fully realizes all that is said above.—ED.]

Hydrated Cellulose.

It has long been remarked that, under the influence of acids, cellulose becomes extremely friable. Paper bleached with a too large excess of chloride of lime, and linen submitted to the action of sulphurous acid, which transforms itself into sulphuric acid, may by the least pressure be reduced to powder. M. Girard, after a series of elaborate ex-



PLAN OF THE UNION RAILROAD DEPOT, WORCESTER, MASS.—[See first page.]