THE PNEUMATIC SYSTEM OF THE WESTERN UNION.

A few years since, pneumatic tubes were laid over short routes in this city and in some of the larger cities of Europe, and they operated so successfully in what might be termed the experimental stage as to soon form a most important auxiliary to aid in the transaction of the regular business of the telegraph office. Some plan to facilitate the quick delivery of dispatches to points at some distance from the main office became necessary, since it was impracticable to send them direct to the branch offices nearest their destination, and since messenger service consumed too much time.

In 1876 the Western Union Telegraph Company laid a pair of tubes, having an inside diameter of 2¼ inches, from the general office, corner of Broadway and Dey Street, this city, to the Stock Exchange, and a second pair to the Cotton Exchange. One tube was for sending and the other for receiving messages. In 1879 a single tube, 1¾ inches in diameter, was laid to each of the six morning newspapers—the *Times*, *Tribune*, *Herald*, *World*, *Sun*, and *Staats Zeitung*. Last year four tubes, 3 inches inside diameter, were laid from the operating room at the central office to the basement of a building, erected by and specially adapted to the wants of the company, at the corner of Fifth Avenue and 23d Street. Two of these tubes are only used for the transmission of through messages, while the others may be used as direct tubes, or may be connected at will to either of three way stations, located at Nos. 407, 599, and 844 Broadway. The line passes from Dey Street, through Broadway to 14th, to Fifth Avenue, to corner of 23d Street. It is the intention in time to extend the system so as to take in the principal hotels, depots, etc., and also private residences, if the business of the occupant should warrant it.

It will be seen that this method divides the city, for all practical purposes, into two main or central stations, the communication between which, by means of the tubes, occupies less than three minutes, each connected with intermediate points, and while lessening the amount of messenger service and repeating, also permits the company to better arrange its force of operators by locating a large part in the 23d Street building.

The tubes are of brass, are of lengths of 20 feet, and are laid in masonry trenches, provided with manholes suitable distances apart. Upon each end of each tube section is a collar, held by the tube being expanded, as in boiler work. The faces of the collars are turned down, and in one is formed an annular groove, in which fits an annular ridge upon the face of the adjoining tube. Thin paper is the packing used. The ends are held together by six bolts passing through loose sleeves placed behind the collars. To provide for expansion and contraction—a most important point, especially in the neighborhood of the steam heating pipes—a slip joint is formed at every 900 feet. The joint is made by slipping the end of one piece of tube inside of the next, which is slightly enlarged to receive it. The inside of the end of the inner tube is ground out to form a sharp edge, which is tempered, so that anything running through will not be likely to get caught. Between the sharpened end and the point where the outer tube is contracted to its normal diameter there is a short space, not exceeding 2 inches in length, where the diameter is so great as to allow the air to shoot past the flange of the passing box; but as the latter is 6¾ inches long and flanged at each end, there will always be one flange in the tube where the diameter is normal. The joint is made air tight by means of a packing box.

Leather boxes or carriers were tried, but had not sufficient strength to resist the concussion caused by their stoppage at each end of the line. The form of the boxes now used, made of vulcanized fiber, is clearly shown in the accompanying engraving. They are 2 inches in diameter, and at one end is a thick pad of felt to take up the force of the blow. The cap consists of three pieces—a flanged cap proper, a leather washer a little longer in diameter than the tube and having radial cuts, and a fiber disk. The cap is held on by a wing nut screwing on a rod extending through the box. Each box will hold about 100 messages on the common blanks.

The plant is so constructed that the system can be operated by the exhaust and pressure methods combined, or by the exhaust alone. At each of the main stations are four pumping engines, built by the Knowles Steam Pump Works, placed in pairs and so arranged that each of the engines can be used independently or in combination with any of its neighbors. The steam cylinders are 18 inches in diameter, air cylinders 32 inches, and the stroke 36 inches. The engines are connected with two sets of iron tanks, one set being for air under pressure and the other for vacuum. Pipes lead from the tanks to the underground tubes and to the tubes used for carrying messages to various parts of the building. Each engine is so constructed that it can be used either for pressure or vacuum, this being accomplished by means of two-way valves placed in both the suction and delivery pipes. The speed of the engine when working as a compressor is automatically regulated by a piston operated by the air pressure in the reservoir; this device is independent of the regular speed governor. The method of cooling the air cylinders is most interesting. The cylinder is trimmed and then bushed with a brass cylinder upon the outer surface of which is formed a spiral groove, similar to the thread of a screw. A small pump forces water into the groove at each head, and after traversing around the cylinder several times the water escapes through a passage at the center. By this plan cold water is applied to the cylinder at each end of the stroke, or at that point where the greatest heat is generated. There are three sets of packing on the cylinder; the center one is of hemp, and at each end of the stroke, where the piston rests, there is a lubricator that feeds oil to the hemp packing, which distributes it through the cylinder.

At each end of each tube is a receiver, those in the downtown office being placed vertically and those at 23d Street being placed horizontally, owing to the want of sufficient space. The arrangement of pipes and receivers at each station is clearly shown in the engraving. The receivers are 16 inches long, and consist of two cylinders mounted upon a frame, so journaled that either cylinder may be brought in line with the tube through which the messages pass. The cylinders move between face plates placed one on each end of the tube. One cylinder is of the same inside diameter as the tube, so that when placed in line with the latter it will permit the box to pass through. The other cylinder is provided with a door held in place by nuts. Beyond the receiver on the end of that tube through which the boxes arrive is the receiver which is now used to stop the boxes, the use of the other having been discontinued on the through line. This consists of a box 12¾ inches long and 6 inches in diameter. The carrier strikes upon a cushion made of leather stuffed with hair.

At the end of the pneumatic tube proper is a pipe, furnished with a valve, that leads to a larger pipe extending to the vacuum tanks. This valve being opened, it will be readily seen that anything placed in the other end of the tube will be drawn through. (Such good results have been obtained when using a vacuum alone, that both vacuum and pressure are not necessary with the present development of the system.) The momentum of the carrier is depended upon to take it to the receiver at the end of the tube; but should it stick midway, a "coaxer" is brought into operation to help it along. This consists of a small valved tube connecting the vacuum pipe with the delivery tube at a point between the two receivers. By opening this valve the carrier will be brought forward.

At the end of the sending tube is a pipe leading to the pressure tank. When the valve in this pipe and the receiver are closed, the engine at the other end of the line is exhausting the air from the whole length of tube. When the receiver—in this case it is used as a sender—is opened, the far engine is pumping air through the tube. To send the carrier, the door of one of the cylinders is removed, the cylinder being in line with the tube. The valve is opened and the carrier placed in the end of the tube, when the air catches it and quickly hurries it along its journey. Back of the receiver is a pipe leading to the compressed air reservoir, so that if necessary the speed of the carrier could be increased by forcing air behind it.

To reach way stations along the line, the tubes curve out of the street and up into the operating room. When a box is to be sent to a way station, the operator of that station is notified by an electric alarm. He at once swings the cylinder having a lid in the line; a wire screen in the cylinder stops the carrier. He then swings this cylinder out, when the second cylinder enters the line, which is then unbroken, so that other boxes intended for other stations can pass on.

In some of the European systems the carriers are dispatched in trains at intervals of from ten to fifteen minutes; but in this system the carriers are sent as often as required, so that there is no time lost in waiting. The capacity of a tube is about 1,000 messages, or ten carriers, per minute. Boxes have been sent between the two main offices, a distance of 14,500 feet, in 2 minutes and 12 seconds.

Capture of a Whale.

After an exciting chase and a terrible encounter lasting over an hour, recently, a mammoth right whale was captured in the ocean off Southampton, L. I. After being killed several miles out from shore, the monster was towed to land by the combined efforts of three boats' crews. It is nearly 40 feet long and 30 feet in circumference, and will yield about 70 barrels of oil, besides the whalebone. Seven hundred dollars have been offered for its head by speculators. It is valued at about $1,200, and is the third whale captured off this coast lately, which is an unusual occurrence.

The whales captured recently are claimed by old whalemen to be members of a school which have been forced close to shore by hunger. The right whale lives by suction, and subsists on a minute insect. Immense quantities of the insects have been washed ashore along the coast of late, which would indicate that they had been driven inland during recent storms. A school of nine whales has been sighted within 15 miles of land, and other captures are expected.

Caring for Wounded by Railway Accidents.

General Superintendent Gallup, of the Boston and Albany Railroad, has recently issued an order to the freight dispatchers and freight train employes of his road which might well, we think, be followed by like action on all railroads, and especially on coal carrying roads. The order provides that the conductor shall carry, as part of his necessary equipment, what is styled an "emergency case," for use in case of injuries. The case contains eleven articles, as follows, with the instructions for use:

No. 1. STYPTIC COTTON.—To control bleeding by applying to wound. See No. 3.

No. 2. ABSORBENT COTTON.—To apply to a bruise on any part of the body.

No. 3. BANDAGES.—To bind up wounds, also to bind over styptic or absorbent cotton, to stop bleeding.

No. 4. PLASTER.—To strap wounds.

No. 5. RUBBER BANDAGE.—To bind around arm or leg, when it is crushed, to arrest bleeding.

No. 6. ARTERY FORCEPS.—To pick up a spurting blood vessel.

No. 7. STRAIGHT SCISSORS.

No. 8. NEEDLES.—To sew up wounds.

No. 9. OILED PAPER.—To apply over burnt surfaces. See No. 11.

No. 10. SILK THREAD.—To tie up blood vessels after being taken up by forceps.

No. 11. BICARBONATE OF SODA.—To sprinkle over burnt surfaces, before applying oiled paper.

These cases are to be supplied by the train dispatchers, the conductors to be held responsible for their contents, and to make written reports of all occasions they have for their use.

We do not see why such provision should not also be made for caring for those wounded by accidents on passenger as well as on freight trains.

Nevada at the Exposition.

The New Orleans *Times-Democrat* has the following to say in regard to the Nevada exhibit at the big Exposition: The exhibit from this State is now well under way, and already presents features of surprising interest. It was to be expected that a State containing the great Comstock lode, a State which can boast of the Sutro tunnel, a State the mineral resources of which have enabled Mackay, Flood, and O'Brien, and the other "bonanza kings" to amass their enormous fortunes—it was to be expected that such a State should send an unequaled collection of minerals and ores. But it is with some surprise that one sees in the midst of the exhibit from Nevada specimens of the cotton plant bearing cotton equal to that of the sea island plantations, potatoes weighing more than four pounds, apples rivaling the finest shown in the collection of any fruit growing State. It is there that the impartial observer may be excused if his enthusiasm becomes unbounded. However, notwithstanding the excellence of the agricultural display, the main feature of the exhibit is the collection of minerals and photographs relating to the great mining industries of the State.

The State Commissioner is Colonel C. C. Thomas, the superintendent of the far-famed Sutro tunnel, and it is to his energy, unaided by any State appropriations, that Nevada owes this magnificent exposition of her resources. The collection is made of specimens from a large number of Nevada mines and several fine collections from private cabinets, notably those of Senator Jones, J. Shaw, S. Dowling, the State cabinet, the cabinet of the Pacific Coast Pioneers, an organization made up of Forty-niners, and W. H. Havenor, who will remain here in charge of the display. The collection is a large one, well classified and labeled.

Specimens of ore are shown which assay at $20,000 to the ton. Large photographs on the wall present vividly some of the picturesque localities of Nevada and views of the more prominent mines. The original drawings of the great Sutro tunnel are also displayed. This marvelous feat of engineering consists of a tunnel eight miles in length, driven into the side of a mountain at a depth of 1,600 to 1,700 feet. The diameter varies from 8 to 16 feet. This tunnel was driven for the purpose of draining the numerous mines clustering around the great Comstock lode. The yield of these mines and the fortunes amassed by their owners are almost beyond computation. But for this tunnel they would to-day be useless. The tunnel itself is no mean source of income to the members of the corporation maintaining it. The method of payment adopted is to collect from each mine drained $1 for each ton of ore taken out and yielding less than $30, and $2 in case the yield is more than $30.

Separation of Oils.

MM. Alexandre Fils, of Paris, have lately invented a process for the separation of the heavy from the light mineral oils. The mixture, after preliminary purification with sulphuric acid, is placed in closed centrifugal drums, which are rotated until the heavier portions settle on the walls of the drum, while the lighter oils are left in the center. After the process is completed, each portion is removed by suitable siphon arrangements.

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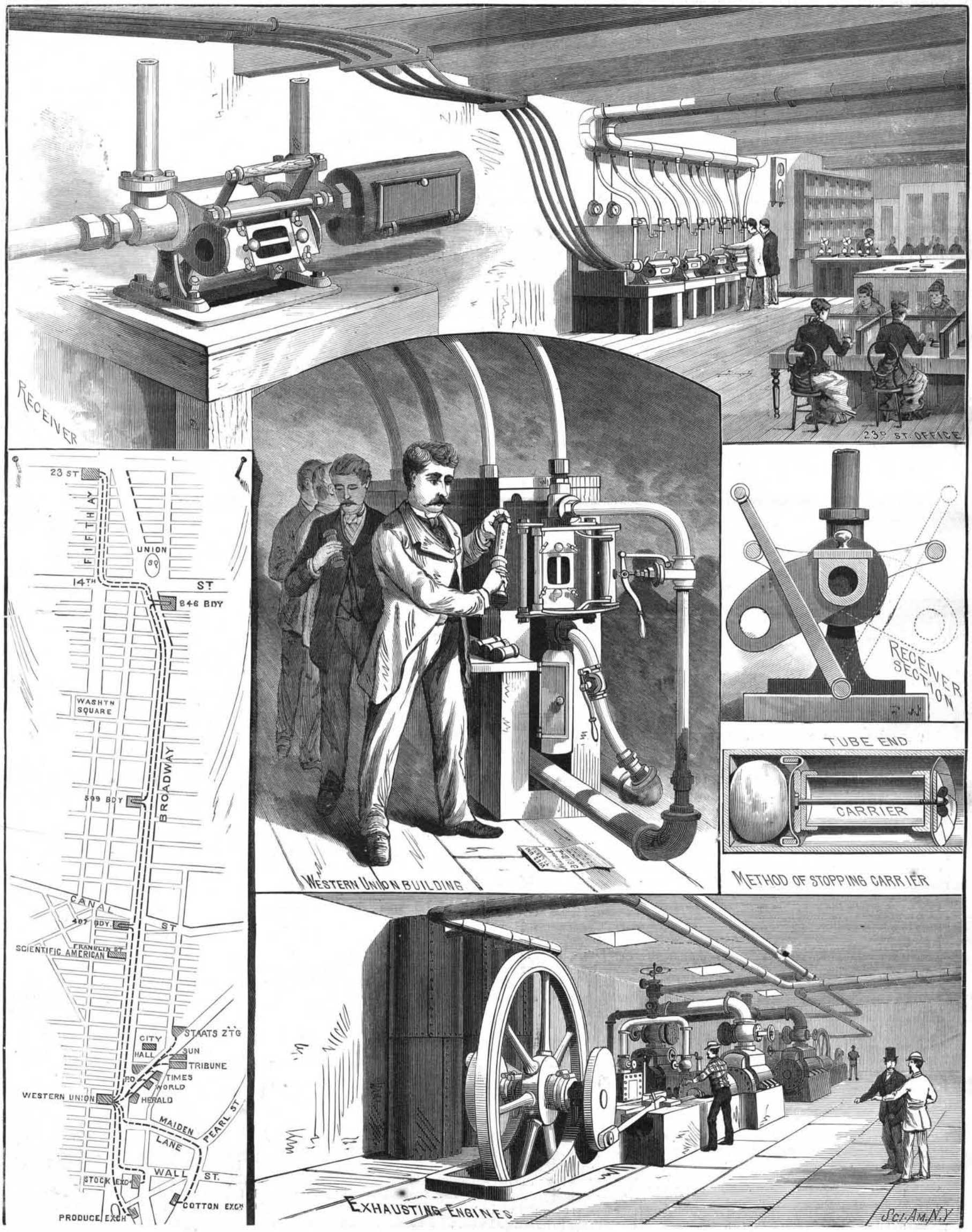

THE PNEUMATIC SYSTEM OF THE WESTERN UNION TELEGRAPH COMPANY.—[See page 100.]