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WEEKLY.

THE SIGNALING SYSTEM OF THE BROADWAY AND SEVENTH AVENUE RAILROAD.

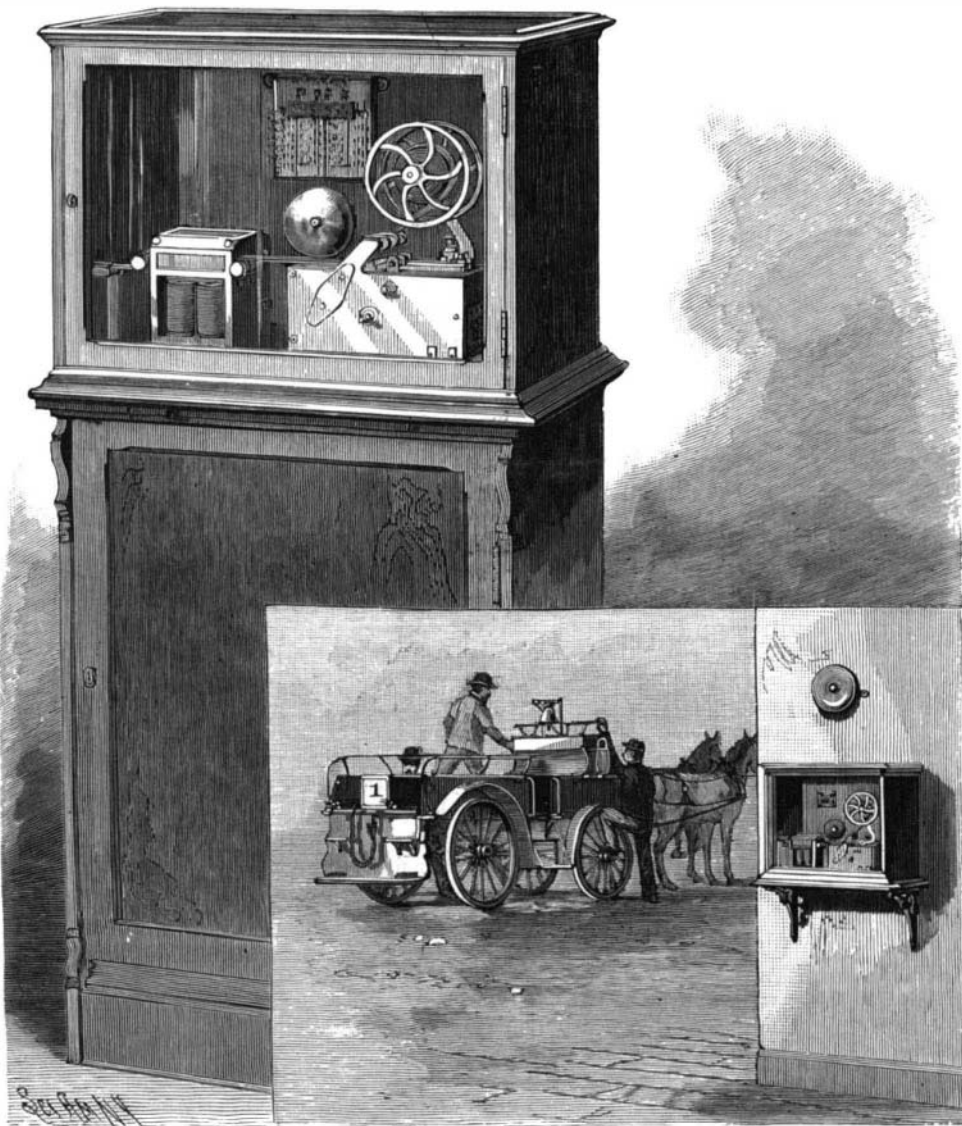
It goes without saying that a railway that must handle a half million passengers daily on one of the most crowded thoroughfares of one of the largest cities in the world must have some system of communication by which delays may be avoided, assistance rendered in case of accident, and by which provision can be made, in case of fire or other hindrance in the street, to resume and maintain traffic. There is no busier railroad than the Broadway and Seventh Avenue cable railroad, and while there is an occasional block, we venture to say that, although few roads do an equal amount of business, none of them operate with fewer delays. This, we think, is in a great measure due to the signaling system employed for communicating with headquarters.

The most frequent cause of delay is the breaking down on the tracks of heavy trucks and other vehicles, which cannot be readily removed and which require the assistance of the emergency wagon and its crew. Fire also frequently causes delays, but the railway company is often able by means of supports to run the hose at an elevation so that the cars may pass uninterruptedly. Occasionally the breaking down of a car or the failure of a cable causes a delay.

One of the more fruitful causes of accident and delay in the early history of the cable road was the fraying of the cable, and the stripping of a strand so as to form a large knot on the cable which the grips could not pass. In an accident of this kind the car was carried along with resistless force, carrying everything before it, with no chance of being stopped until a signal could be sent by some roundabout way to the power house to stop the cable. Pedestrians and all vehicles occupying the middle of the street were at the mercy of the runaway car. Nothing could be done but to give it a free course until the cable was disconnected or the engines stopped.

Now this and every other imaginable emergency is provided against so as to reduce the interruption to a minimum.

The electric signaling system of the Broadway and Seventh Avenue Railroad is illustrated in the annexed engravings, two of which show the indicators, alarms and regis-



REGISTERING INSTRUMENT AND EMERGENCY WAGON.

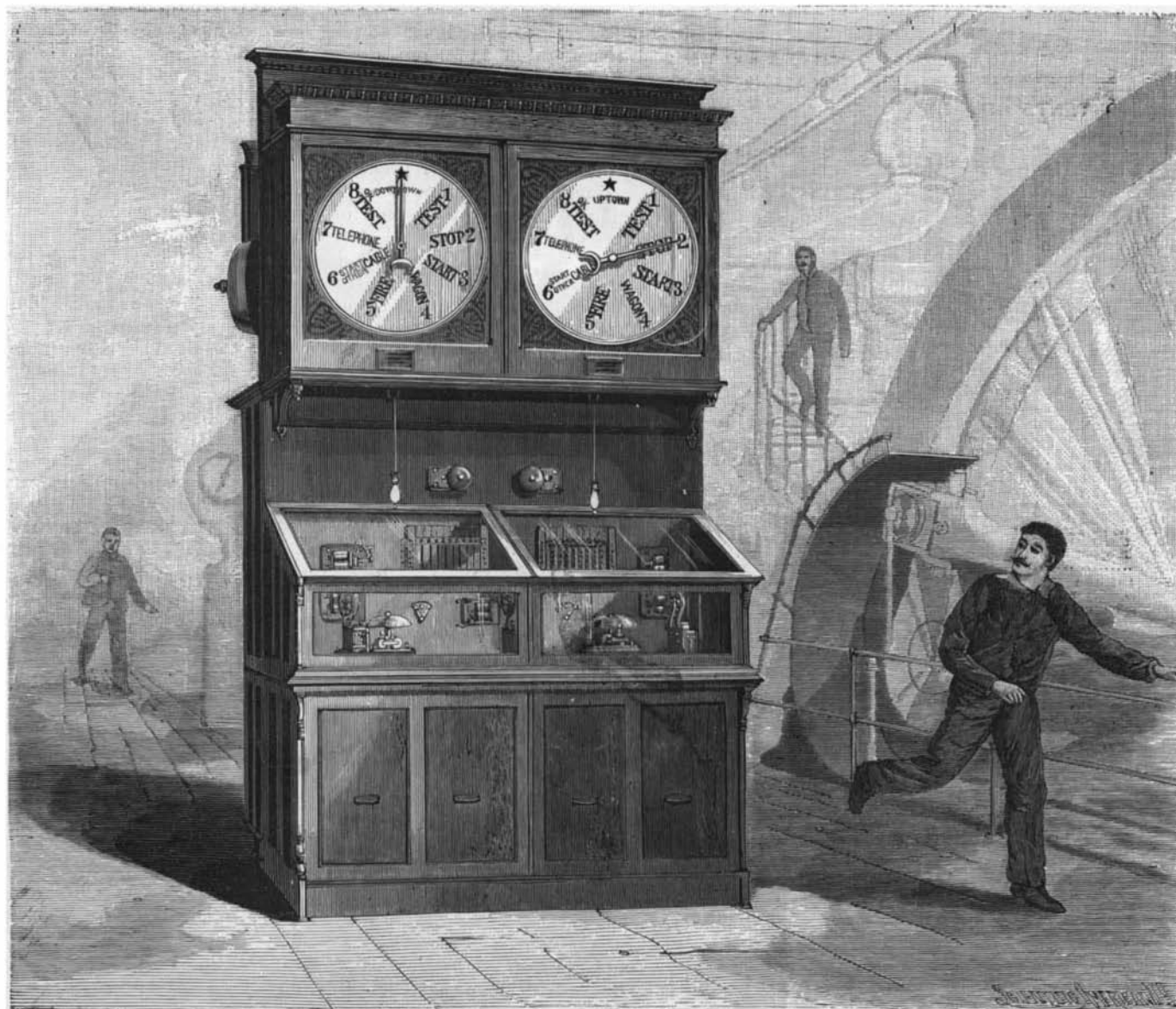
tering apparatus at the power station, one showing the street signaling box, and another a diagram on which the circuits can be readily traced. Every section of the road has at least two signaling wires. An additional wire extends from Houston Street to Fiftieth Street, on Broadway, and three wires extend the length of Twenty-third Street and Lexington Avenue branch.

In the engine rooms at the power station are placed indicators and alarms, and in the president's office is placed a recorder and time stamp, which makes a record of every call. The call boxes are placed in openings in the pavements, covered by heavy iron plates. They are inserted in the circuits and used in the same manner as in fire and district telegraphs, and they are each provided with a revolving lever and contact points corresponding with the words on the indicator at the power station. The call box has the same words arranged in the same order, so that when the lever is turned the circuit is opened and closed, causing a movement of the index in the indicator corresponding with the movement of the lever in the signaling box. At the same time the alarm gongs are rung, a record is made in the president's office, and the time is stamped on the record ribbon. An alarm is also sounded within the hearing of the men having charge of the emergency wagon, so that the wagon may proceed immediately to the location of the trouble. The wagon carries extras and tools,

with a sufficient number of men to remove any ordinary obstruction or to make such repairs as are usually needed on the road. There are four such wagons, each carrying a force of men sufficient to cope with almost any trouble. One of the wagons is located at the Houston Street power house, another at Lexington Avenue and Twenty-third Street, the third at Ninety-ninth Street and Lexington Avenue, and the fourth at Fiftieth Street and Broadway.

Cards are furnished to the conductors, gripmen, and inspectors, giving the location of the boxes and other important items. Each box has an individual number. In case of an accident, the conductor, gripman, or inspector uncovers the signal box in the street and sends an

(Continued on page 6.)

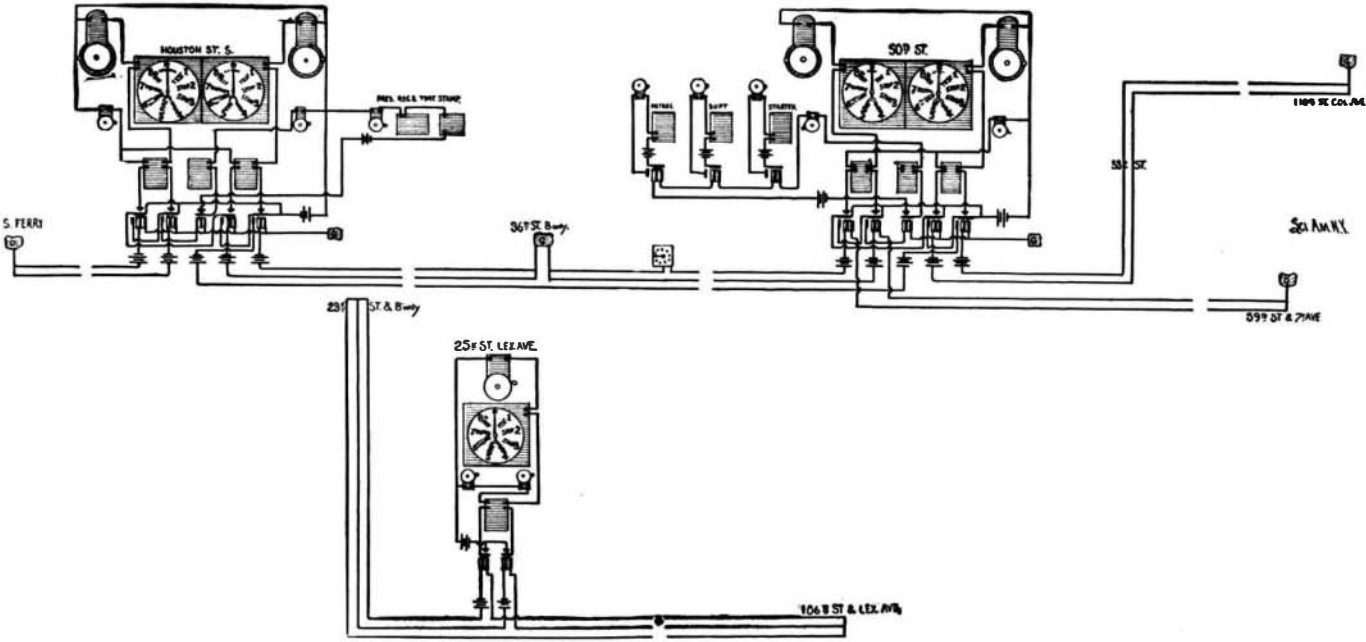


INDICATORS AND ALARMS IN ENGINE ROOM OF POWER HOUSE.

THE SIGNALING SYSTEM OF THE BROADWAY AND SEVENTH AVENUE RAILROAD.

(Continued from first page)

propriate signal which will stop the cable or send out the wagon, as the case may be. If the cable is to be stopped, the index points to stop on the dial; the gong sounds the alarm, and there is for the moment great activity in the engine room, where the men rush for the throttle valves and shut the steam from the ponderous engines, or disconnect the cable drums by operating the clutches. If there is an obstruction on the track, like a broken down truck, for example, the wagon is signaled for and the men jack up the truck, attach a false wheel (which they carry and which is like a sleigh runner) and remove the truck from the track. When the track is again clear a signal is sent which indicates that the engines are to be started. Telephone connections are provided, so that conversation may be carried on between the power station and any point on the road.



ELECTRICAL CONNECTIONS OF SIGNALING SYSTEM, BROADWAY AND SEVENTH AVENUE RAILROAD.

The Mother Lode.

BY ENOS BROWN.

The term "Mother Lode" is a designation of the early miners of a vast mineral deposit of gold bearing quartz veins of a definite character occupying a central position in the great auriferous slate belt identified by Prof. Whitney, and extends in a northwest and southeast direction through the foot hills paralleling the Sierra Nevada Mountains which form the eastern boundary of the State of California. It begins in Mariposa County and runs northerly through Tuolumne, Calaveras, Amador, Eldorado and Placer Counties. North of Placer County it becomes less well defined, but appears in portions of Nevada, Butte, Sierra and Plumas Counties. In these ten counties most of the gold produced in California has been extracted. The Mother Lode proper, however, includes a region about one hundred miles in length from north to south, with a width ranging from five to fifty miles, with an average altitude of 2,000 feet, and constitutes the largest, richest and most remarkable metalliferous deposit of precious metals known in the world.

In this district is found a large number of gold bearing quartz veins irregularly distributed and interrupted by sterile and unproductive areas which usually occur in a belt of black slate with either slate, diabase, serpentine and occasionally granite as wall rock. In these veins is generally found a peculiar green vein matter which has been considered as characteristic of this auriferous belt and has received the name of mariposite, from the fact of its being found so abundantly in Mariposa County.

The veins of this region are also considered more reliable from the fact that they have proved, in some cases, to be rich at a depth of 2,000 feet, and consequently permanent producers.

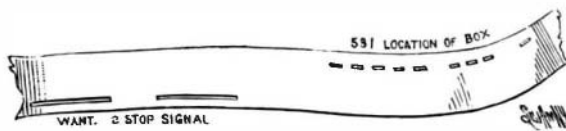
The largest and most important gold mines in California are located in this belt, the Church, Plymouth, Eureka, Keystone, Morgan, Utica, Rawhide, Josephine, Saulsby, Idaho, Empire, Kennedy, Princeton, Sheepbranch, Providence and others with their record of mil-

lions. From observations of geologists it would appear that the origin of this vast reservoir of mineral wealth in all probability was that, at the time of the upheaval of the Sierra Nevadas, and the consequent disruption and tilting of the adjacent rocks, a series of fissures were formed which were subsequently filled with quartz and other mineral matter by alkaline water at a high temperature. Alkaline solutions at a high temperature and under great pressure will dissolve large amounts of

quartz, which is deposited in a crystalline state on the cooling of the solution. This process is still in operation in the State, and there is nothing improbable in this theory when the unnumbered centuries occupied in these geological changes are considered. But how did the gold get there? This is a question that has puzzled scientists exceedingly and has been the subject of much profound investigation. A large proportion

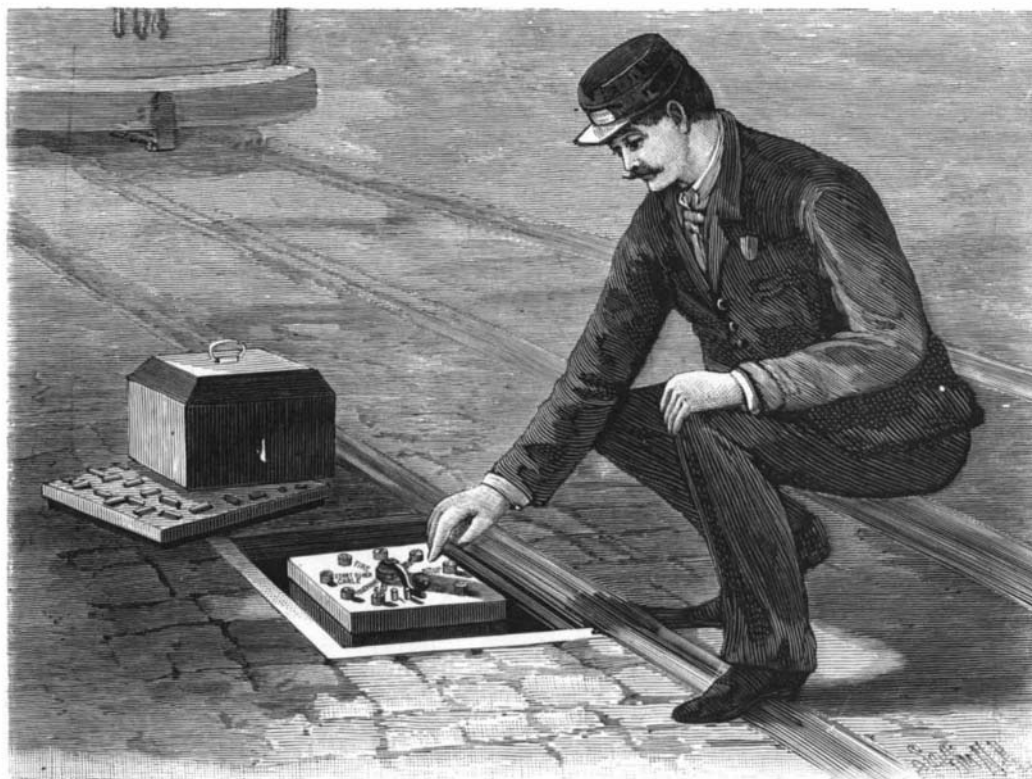
of the gold found in the quartz veins of the Mother Lode is in an exceedingly fine state of division and in intimate association with sulphur and pyrites. A good deal of it is, however, free and disseminated through the rock, from which it can be separated by pulverizing and carefully washing the resulting powder with water, leaving the gold behind.

This fine gold might have been carried into the



THE RECORD STRIP.

quartz mechanically at the time the fissures alluded to were filled with the quartz they now contain, but theory would not account for the large masses or pockets which are often encountered and whose formation has been explained by some scientists as due to electric currents which we know exist in the earth's crust, bringing the small particles of gold together from surrounding rocks. It is also probable that the element called tellurium has had much to do with the



STREET SIGNAL BOX-SIGNALING POWER HOUSE.

deposition of gold in the veins of quartz. Tellurium is a volatile element which sublimates at a low temperature and carries the gold with it. In all probability it has had much to do with the depositing of gold in these mines.

The hope of California as a gold producing section lies in the development of the Mother Lode. From only a few mines within a limited territorial range it is producing \$10,000,000 annually. Its area is mostly maiden ground which only waits the effort of labor

backed by capital and intelligence to make it the richest gold producing territory in the world. The lode has produced in the past hundreds of millions of dollars and the future is bright for it. In every portion of the lode can be found groups of prospectors searching diligently for indications, and results are sure to follow. Railroads are being projected to pierce the region of the Mother Lode and to make it accessible without laborious effort. The owners of the Mariposa grant have announced their intention to develop that rich section and to re-open the mines which heretofore have produced such quantities of rich ore. All is activity on the Mother Lode, and the people of California view with much complacency efforts which they fondly expect will bring to them again the flourishing days of old.

Tiny Little Brains.

Dr. William A. Hammond, the celebrated neuro-

logist, says the ganglia, which run like little threads of silk throughout the body, are tiny little brains, largely made up of the same kind of gray matter that composes the thinking part of the brain. While the sensitive ganglia send their little tendrils into every portion of the body, there is an especially large amount of them about the heart, and, really, according to Dr. Hammond, the human heart actually thinks on account of it. When we are frightened, the heart almost stops beating.

How could it do it, unless it really thought? It would be impossible.

The heart brains are the little gray ganglia, and they recognize the emotions of joy or pain or fright by sending quick throbs and thrills through the heart, which Dr. Hammond calls a secondary brain. It is well known that the ancients believed different organs of the body to be possessed of mental attributes, and this idea has been handed down to us in such expressions as a "brave heart," a "noble heart," a "spleenic nature," and the like.

Crossgrained people are said to have their spleens out of order, and the ancients located anger, resentment and impatience in the spleen.

An immense amount of gray matter or tissue runs back of the stomach, and a heavy blow there will kill as quickly as if the brain itself had been struck.

Wherever the ganglia congregate is a vital spot, and instead of thinking solely with the gray matter that is within our skulls, we think in every important organ and throughout every prominent function within our bodies. So says Dr. Hammond, and science, adds the New York Tribune, seems to agree with him.

The St. Elmo's Fire.

In the June number of the *Annalen des Hydrographie* there is an interesting discussion by H. Haltermann, of the occurrence of St. Elmo's fire at sea, based upon observations in the log books received at the *Deutsche Seewarte*. The tables contain full details as to position, conditions of weather, etc. During more than 77,000 days of observation the phenomenon was observed 164 times, 87 times in north and 77 times in south latitude. Its occurrence differs very considerably in different parts of the ocean—e.g., in the ten degree square lying between the equator and 10 deg. N. lat. and between 20 deg. and 30 deg. W. long., St. Elmo's fire was observed about three times per 1,000 days, while in the two squares lying between 50 deg. and 60 deg. S. lat. and 60 deg. and 80 deg. W. long. it occurred six times per 1,000 days. The more frequent occurrence at sea than on land is attributed to the fact that the accumulating electricity is more easily conducted by the numerous objects projecting into the air over the land.