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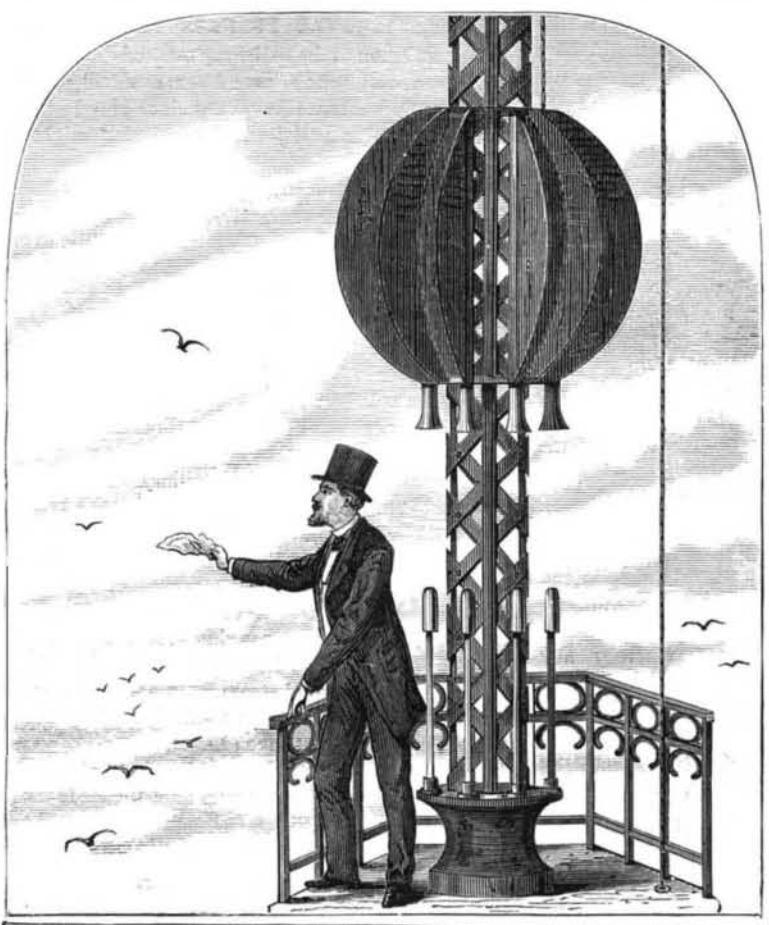


ELECTRIC TIME SERVICE FOR NEW YORK.

What's the hour? In these words the time query was anciently put; and the answer named the hour, never the minute. Exact time recorders were unknown to the multitude; time was estimated rather than measured; and anything within the hour was practically close enough. The almost disused proverb, "It's always ten until it's eleven," remains to tell of the carelessness of our great-grandfathers in this respect.

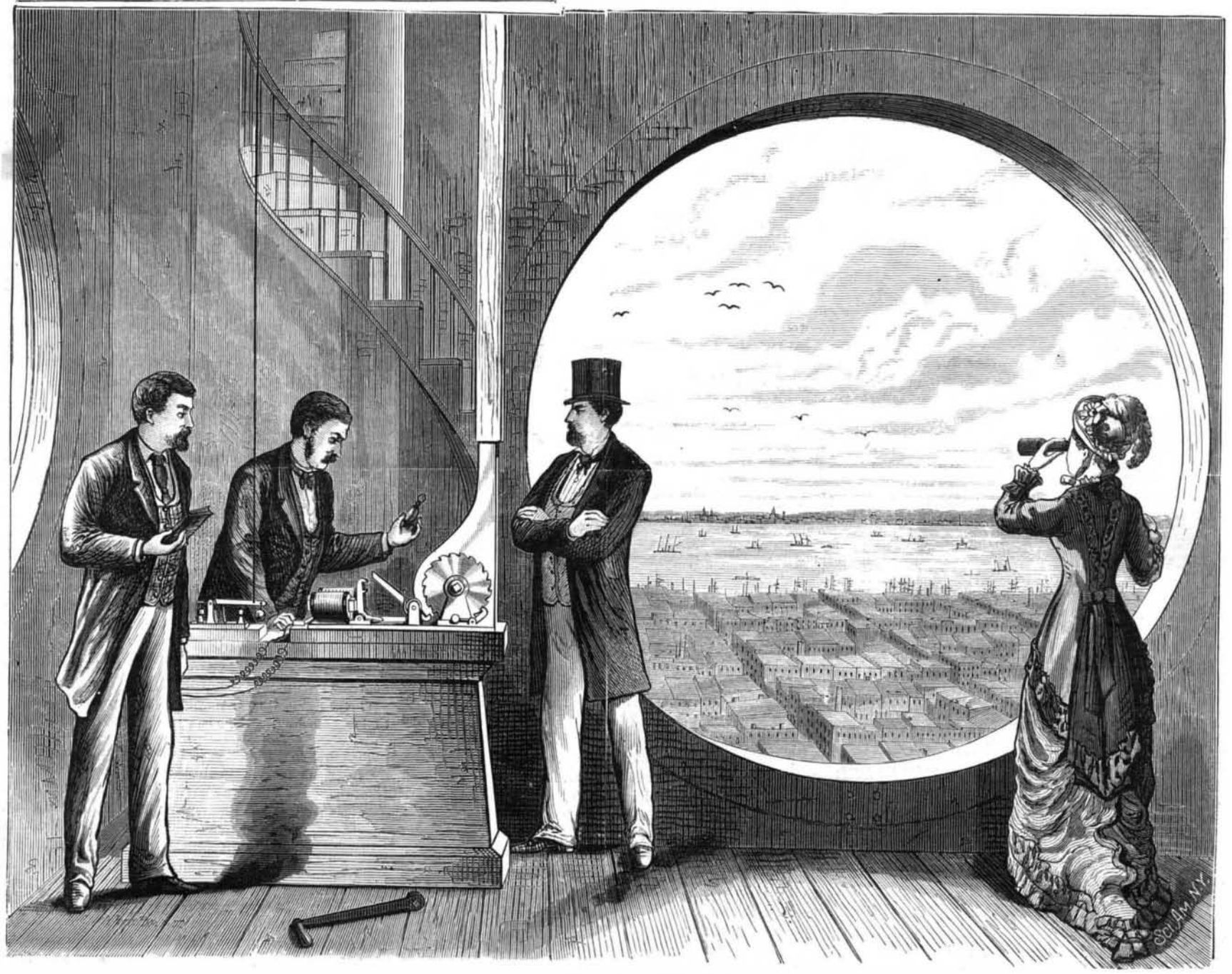
Washington's reply to his secretary, who had delayed an important meeting half an hour and tried to excuse himself by saying that his watch had lost half an hour, "You will have to get a new watch, or I a new secretary," shows that the day of the proverb was then well past. Had the watch been only a quarter slow, the excuse would probably have been accepted.

With the increasing perfection of timepieces and the extension of the custom of carrying watches, the limit of tolerable variation was soon reduced to five minutes, or even less; yet the time is within the recollection of most men when, were a man to give the odd minute in response to the question "What is the time?" he would be laughed at as a prig who wanted to show off his watch as something uncommonly fine. Now it is no unusual thing to hear men name the nearest second, and qualify the remark by saying that their watch is two or three seconds fast or slow by the time ball or some other popular standard. Away from our commercial manufacturing centers so great a refinement of time measurement may seem to be needlessly nice. What odds can a minute more or less make any way to an easy going farmer or laborer? The odds may be very small indeed, but the traveler does not think so when he misses an important train by being a minute late, nor the merchant whose notes go to protest because his messenger is that much behind time. Where large and complicated affairs are being carried on, as in railway management, the time element becomes vitally important; and in this connection the railways of the country have been a powerful means of popular education.

It was from the necessities of railway management, indeed, that the electric time service grew up. The safety of life and property demanded that the servants of each road should not only have trustworthy timepieces, but that they should all be regulated by some common standard. The history of the development of the electric time service for railway purposes, however, does not fall within the scope of this article, though it would be well worth recording: our purpose is rather to describe and illustrate the special application of the service to this city.

Allusion has been made to the time ball. Many of our distant readers may not know that the standard time of this

[*Continued on page* 337.]



THE ELECTRIC TIME BALL.

PATENTS FOR PROTECTING THE DEAD.

In consequence of the increasing number of graveyard desecrations, the genius of the inventor has been incited to devise means for their defeat. Among the most recent patents is one for a coffin torpedo, which consists of a canister containing powder, balls, and a firing trigger, so arranged, that on placing the torpedo within the coffin, and finally closing the lid, should any attempt be made to open the coffin, the torpedo will be instantly exploded, a noise like thunder ensue, and deadly balls will fly in all directions. Had the remains of the late millionaire, Mr. Stewart, been protected by means of this invention, the neighborhood in that part of our city where his body rested would have been alarmed, while the robbers themselves would doubtless have suffered sudden death as the penalty of their rash and sacrilegious attempt.

THE OFFICIAL REPORTS OF THE PARIS EXHIBITION.

The general report of the Paris Exhibition will be made by Assistant Commissioner General F. A. P. Barnard, President of Columbia College. Dr. Barnard proposes to depart from the usual custom of making a voluminous catalogue of all the articles on exhibit and making more or less superficial comments on each class. Instead he will view the Exhibition chiefly from the standpoint of a political economist as to the evidences it furnishes in its exhibits of the gradual but certain substitution of machine work for hand work, and the social and political effect of this as shown by statistics carefully gathered from the best sources in all countries. In the collection of these statistics he has met with the cordial assistance of the largest manufacturers of Great Britain and Continental Europe. Special reports are to be made by each of the nine commissioners in charge of the nine groups into which the American section was divided. These commissioners are expected to embrace in their report all the classes in the respective groups under their control. These reports, Dr. Barnard says, in the very nature of things must be incomplete and unsatisfactory, owing to the fact that the group of classes embraces industries of so miscellaneous a character that it would be hard to find any one man capable of making a detailed report upon each. For instance, under the head of education and science are grouped education in its primary and higher branches, medicine, surgery, printing, books, instruments of precision, asylums, schools, colleges, prisons, and a multiplicity of other things which no one man is likely to possess a sufficiently intimate knowledge of scientifically and exhaustively to report upon them. As in this group so it is in all the others.

SKILLED LABOR IN NEW YORK CITY.

In order to discover the real condition of the labor market of this city, the *Daily Bulletin* has thoroughly canvassed the leading industries of the city, and in its issue of October 24 it published in detail the result of its inquiries. The grand results are shown in the table below, in comparison with the corresponding statistics for the fall of 1873, just preceding the great financial and industrial collapse:

	Hands Employed.		Wages.	
	Oct. 1878.	Oct. 1873	October. 1878.	October. 1873.
Printers and electrotypers ..	207	183	$9 50	$10 50
Printers and bookbinders.....	406	300	10 00	12 00
Job printers.....	—	—	16 00	20 00
Tobacco manufacturers.....	2,060	1,925	6 30	8 50
Book publishers	1,300	1,300	7 to 12 per c. lower	
Stationers.....	275	275	14 00	20 00
Cabinet makers	450	305	13 00 to 15 00	18 00 to 21 00
Billiard table manufacturers..	100	100	15 00	22 50
Carvers (Eureka Company)...	10	40	15 00 to 18 00	35 00
Card manufacturers.....	150	300	7 00	7 50
Pianoforte manufacturers....	850	700	14 00	18 00
Sewing machine manufs.....	1,000	800	18 00	18 00
Soap manufacturers.....	150	150	9 50 to 10 00	12 00 to 15 00
Plumbers.....	14	14	15 00	15 00
Hydraulic works.....	350	100	13 50	15 00
Steam engine works.....	160	125	12 00	15 00
Paint manufacturers	80	66	9 00	12 50
Jewelers	75	55	12 00	14 50
Sugar refineries.....	1,100	850	8 50	11 00
Silversmiths.....	90	90	24 00	30 00
Iron manufacturers (about)...	50	300	16 00	16 00
	8,877	7,578	$13 00	$19 20

While this table is not offered as an exhaustive statement of the industrial condition of the city, it at least affords a fair presumption that the demand for skilled labor in this city is quite as good as it was in the flush times before the panic. So far as the inquiries went, there had been an increase of 17½ per cent in the number employed. On the other hand, the average decline in wages was nearly one third; that is, nominally. It is to be doubted whether three dollars would have purchased more in 1873 than two dollars will now.

THE COST OF INSECURITY.

The great robbery of the Manhattan Savings Bank has incited a *Herald* writer to look up the more notable burglaries of the past fifteen years. The list embraces some seventy-five or more banking institutions that have suffered in this way, the aggregate loss footing up about $15,000,000. Thus it appears that in this country alone, in one class of robberies, an average loss of a million dollars a year has been sustained. A single year's burglar tax would probably supply time locks and electric alarms to every bank vault in the land.

Electric Light Patents.

The revenue of the English Patent Office is being greatly increased by the number of applications for appliances in connection with the electric light. It is said that as many as two or three applications are filed every day, and that the inventive genius of the Old World has never been so active as at the present time.

ELECTRIC TIME SERVICE FOR NEW YORK.

[*Continued from first page.*)

city has for some months been determined by the dropping of a ball above the Western Union Telegraph building, at the corner of Broadway and Dey street, precisely at noon each day; and few of those who daily avail themselves of the means thus afforded for regulating their timepieces understand the mechanism by which the ball is dropped at the right moment by an operator seated in the National Observatory at Washington, two hundred and forty miles away.

The upper portion of Fig. 1, front page, shows the time ball raised a little above the supports on which it is received when it falls, and also the structure of the iron pole on which the ball slides. The plan of the ball is shown in Fig. 2. Though from a distance the ball appears to be solid, it is in reality composed of a dozen thin vanes of sheet copper disposed radially, half of them semicircles, the rest crescents. By this device the visual effect of a solid ball is secured with the least possible resistance to the wind, or to the air when falling. The man in the figure stands 287 feet above the street, and the ball rises 28 feet higher. The ball falls 23 feet, and is received by the six plungers already mentioned, which enter the closed cylinders attached to the ball, providing as many air cushions for the arrest of the motion of the ball without the shock. The moment the ball begins its downward course is noon.

The operating of the ball is a matter easily explained. Five minutes before noon the officer in charge of the station climbs to the room shown in the lower part of Fig. 1, and raises the ball nearly to the top of the pole. This is done by means of a drum fixed at the right hand end of the table; the cord from the drum passing upward through a box to the foot of the tower, thence through the air to the top of the pole, where it passes over a pulley and is attached to the ball. Two minutes before noon a signal is received from Washington that all is ready, whereupon the ball is raised to the top of the pole, and the crank removed. The ball is now held in position by means of the lever shown in the cut, one end of which engages the ratchet wheel of the drum, the other being caught in the notch in the little standard to the left. The latter is attached to the armature of an electro-magnet, which is placed in telegraphic connection with the National Observatory at Washington. At the moment of noon, New York time, the officer in charge at Washington closes the circuit; the armature is retracted, the lever disengaged, and the ball drops. The instant the ball reaches the base of the pole the fact is automatically reported at Washington through the electric tell tale shown at the left end of the table, Fig. 1. Owing to the great height of the ball when raised, it is visible for many miles around; and directly or indirectly the clocks and watches of some two millions of people are thereby kept from straying far from the true time. Even as far off as Bayonne, N. J., according to a local paper, the principal of a public school regulates his clock daily by the falling ball. The ball and its discharging apparatus were designed by Mr. George M. Phelps, Superintendent of the Western Union manufactory. The public service thus rendered by the Western Union Telegraph Company is wholly gratuitous, and affords not only a notable illustration of the public spirit of our great commercial corporations, but also an illustration of the far-reaching indirect benefits which applied science is constantly conferring upon modern life, free of expense to the recipients.

Fig. 2.

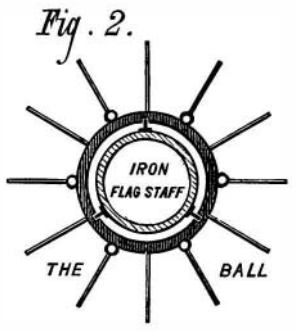


Fig. 3.

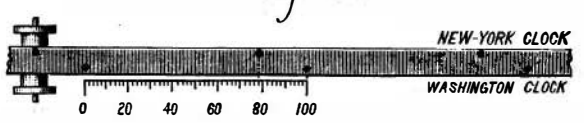
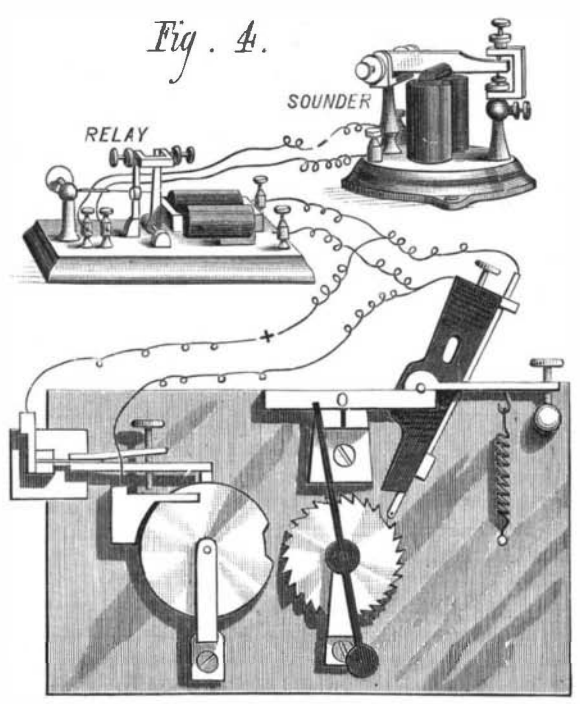


Fig. 4.



But the time service does not end here. To reap the full benefit of the time ball, a great number of people must watch for its fall; that takes time, and time is money. It is cheaper to employ one man with a little machinery to regulate the time of all, and the service is much more surely attended to. Accordingly Mr. J. Hamblet has introduced a system of constant time service, by which our clocks may be kept constantly under the electrical control of a central regulator or standard clock, which is kept in exact time with the clock of the National Observatory, due allowance being made of course for the difference in geographical position.

The central regulator is stationed in the Western Union Telegraph Company's Building, and is so constructed as to keep time with the highest attainable accuracy. In addition, it is every day compared with the clock of the National Observatory at Washington, and checked by the daily time observations made at the observatories at Allegheny, Pa., and Cambridge, Mass., with which it is in telegraphic connection. By this it must not be inferred that the clock in question is kept in exact accord with either or all of the observatory clocks, that being a mechanical impossibility. The range of variation, however, is kept within a few hundredths of a second.

The reader must not be incredulous; it is possible to measure, nay more, to record, the hundredth part of a second. Fig. 3 will make clear how it is done. It shows a section of the paper tape of the chronograph, which is used in comparing the standard clock with the clock of the Washington Observatory. The chronograph is electrically connected with both clocks, and records the pendulum beats of each on the strip of paper. If the beats are exactly synchronous the dots stand side by side. If the beats are not synchronous the dots will be separated by an interval, long or short, according to the difference of the clocks—that is, the difference in time between the beginnings of corresponding beats—and the speed of the chronograph. Supposing the clock to be beating seconds, and the chronograph to discharge an inch of tape each second, it is obvious that the dots recording the beats of each clock will stand one inch apart. It is obvious, too, that the lineal space between the recording dots of two clocks not beating exactly together, can easily be measured, as shown by the scale placed below the dots in the cut (Fig. 3), and thereby the difference in time exactly determined.

The next step in the time service is to distribute the accurate time thus maintained to such as want it, which is done through an electrical attachment to the standard clock. This controlling clock was constructed by E. Howard & Co., of Boston, from designs by Mr. Hamblet, and has a Dennison gravity escapement. The front clock plate and the electrical mechanism are shown in Fig. 4. The wheel in the center with the second hand revolves once a minute. One of its thirty teeth has been filed away, the vacant space causing the omission of the tick which would otherwise mark the fifty-eighth second of the minute. The remaining teeth act upon a delicate jeweled spring, which breaks an electric circuit at the passage of each tooth. The two wires connecting with this spring and its banking operate the relay, at the left of the figure, and through it the sounder, which indicates the beginning of each minute by a pause of two seconds. The beginning of each five minutes is identified by a pause of twenty seconds, obtained through the agency of the five minute wheel to the left of the seconds wheel. At each revolution of the five minute wheel the lever at the top drops into the notch in the wheel, making electric connection between the two wires governing the relay, thus preventing the minute wheel from breaking the circuit for the space of twenty seconds. At the right near the top of the figure is shown a sounder, which may be located at any point on the lines. It is by means of these sounders, with which the recipients of the service are supplied, that their timepieces are regulated.

The practical advantages of this constant and trustworthy time service will appear to any one who has to do with important commercial or industrial affairs. One of the great sources of friction in social and business intercourse is time variation and uncertainty. The maintenance of a common and authoritative standard will go far to lessen such friction, to the great time saving of all classes, and the prevention of many mistakes and misunderstandings. Where thousands are engaged, delays of no more than a minute at a time amount in practical effect to the loss of hours, days, even months of individual labor. In a factory employing only three hundred men, a variation of one minute in the signal for starting and stopping means the loss of one man's work for a whole day.

The immediate direction of the New York Time Service is in the hands of Mr. Hamblet, Room 40, Western Union Telegraph Building. The business generally is controlled by the Gold and Stock Telegraph Company.

Left Handedness.

At the late meeting of the British Association, Dr. H. Muirhead made a communication on "left handedness." He thought it depended upon which half of the brain took the lead. Left handedness once begun in a family was likely to run in it. It was a curious fact that left handed people had the left foot one third to one eighth of an inch longer than the right.—*Med. and Surg. Rep.*

The Testing of Boiler Iron.

A number of Eastern boiler plate manufacturers, with the manufacturers of this and other States, lately met at the Continental Hotel, Philadelphia, to reconcile the differences of opinion existing between them and the officers of the Steamboat Inspection Service, and to decide upon some satisfactory method of testing the qualities of boiler iron. The result of the meeting was the adoption of the following:

Resolved, That, in the judgment of this meeting, plates which show a contraction of area of less than 12 per cent shall not be used in a steamboat boiler. We therefore recommend that all boiler plate stamped with a tensile strain of under 45,000 lbs. should show a contraction of area of 12 per cent; 45,000 lbs. and under 50,000, should show 15 per cent; 50,000 lbs. and under 55,000, 25 per cent; 55,000 lbs. tensile strength and over should show 35 per cent.

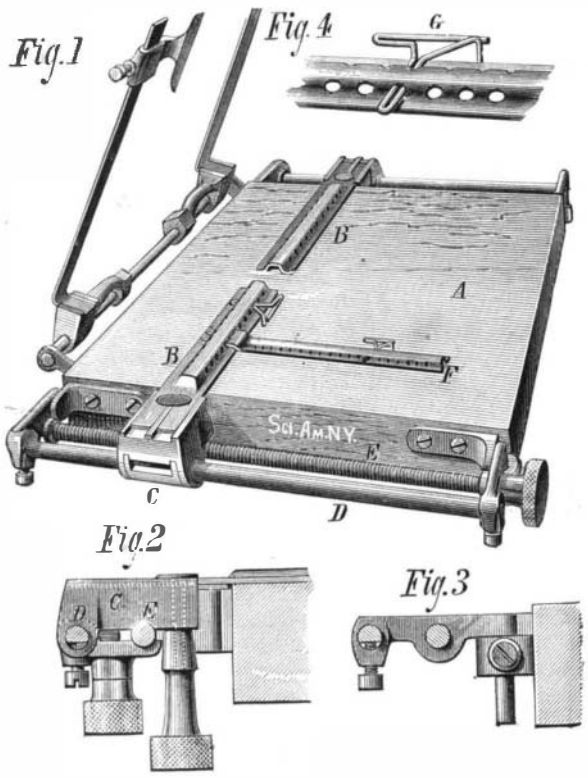
Whereas, The question was raised before the meeting of the Board of Supervising Inspectors at a meeting last January, in regard to the form of test piece that they had adopted; and

Whereas, The Board, in order to meet the views of the manufacturers, adopted two modes of preparing the test piece, with a view to ascertain which was right; therefore

Resolved, That the thanks of this meeting be extended to the Board for that act of courtesy which has resulted in the fact that there is no practical difference in showing the two modes, and that we respectfully suggest to the Secretary of the Treasury that test pieces cut from the plate to be used in steamboat boilers should all be tested at some central location by a person appointed by the Secretary of the Treasury, to be under the direction of the Supervising Inspector General of Steamboats.

A NEW PLATEN GAUGE.

The accompanying engraving shows, in perspective and in detail, a novel gauge applied to the platen of a printing press for holding and guiding the paper that is printed upon. The platen, A, is of the usual form, and has upon



HALLECK'S PLATEN GAUGE.

one of its edges a shaft carrying the usual grippers. Adjustable finger bars, B, are clamped by their slotted ends to split nuts, C, that slide on the rods, D, and are moved by the screws, E, which, together with the rods, D, are supported by removable brackets (Fig. 3) at the sides of the platen. The split nut, C, is capable of being tightened by means of the nutted screw, as clearly shown in Fig. 2. When the finger bars, B, are attached to the adjusting nuts, C, they extend along the face of the platen parallel to its longer sides. The finger bar has a raised middle portion, having a series of side perforations for receiving the shanks of the side and end gauges, and also the supplementary finger, F, which is also designed for receiving the gauge pins. The finger bars may be instantly removed when it is desired to clear the platen for a fresh blanket.

The gauge pins, G, are made of wire in the form shown in Fig. 4, and they are readily inserted into or removed from the fingers. They form a reliable guide for the edges of the paper, and facilitate the adjustment of the press, while pin holes in the blanket are avoided.

This improvement was recently patented by Mr. Samuel P. Halleck, of Oriskany, N. Y., from whom further information may be obtained.

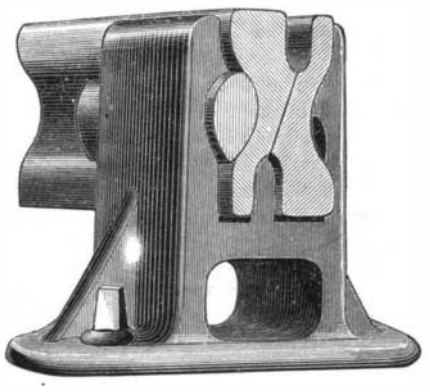
Polarized Light.

A correspondent of the Philadelphia *Public Ledger* calls attention to the circumstance that an extensive exhibition of polarized light is to be seen twice a week in the International Exhibition Building in that city.

When the electric lamps are in action on Wednesday and Saturday evenings, the light, passing obliquely, at an angle of about 56°, through the thick glass of the show cases (the plates stand at right angles), instead of throwing a faint shadow on the floor, as might have been expected, forms an exquisite appearance of irregular, bright, oval lines, like large lacework, surrounding spaces softly blended in shadow. This accidental exhibition is, to many persons, alone worth the fee to those evening entertainments.

TRAMWAY RAIL EXPERIMENTS.

Tramways are now becoming a subject of great interest to the engineering world and the general public. Improvements in detail are still being continually made; but much



remains to be accomplished, and in no direction can more effectual improvement be introduced than in the road and rails. Upon the durability and freedom from repairs of the road depends very much the financial success of the tramway. We may all easily understand the time and money constantly being expended in our streets in taking up large stretches of the roadway to relay tram rails. To minimize this outlay two objects should be kept in view in the construction of the road. In the first place the rails and road should be solidly constructed, and supported so as to offer the best resistance to wear and tear; and, secondly, the rails and attachments should be made so as to offer the greatest facility for removal of the rail without disturbing the roadway. Messrs. Aldred and Spielmann have introduced a split rail and chair. The running over this compound rail is most smooth, and puts an end effectually to many complaints which travelers in tramcars, railway trains, omnibuses, and even cabs are often ventilating. We may, with advantage, give a synoptical outline of the system here.

The rail is a compound split one, formed from two similar duplicate halves reversed to one another. So that the broad head of one is uppermost, while the narrow head of the other half forms a guard to the broad tread. The two halves of the rail meet one another on an inclined surface, so that the downward pressure on the one half is received and resisted by the other half. When one half is worn out, the rails can be reversed, and the worn half turned down and used for a guard. The split diameter of the rail enables the joint to be made only in one half at a time, so that in no place is the rail wholly broken and dependent only on fish plates for its continuity. The rail has the joint broken only in one half in one place, and always in a chair, the rails overlapping, and thus always forming a continuous and well supported line. The joint in the chair is secured by a wedge or key in the hollow chest of the rail, thus making everything secure at the joint, and entirely dispensing with fish plates and through bolts and punching of rails. This makes the road and metals very cheap, so that a much heavier and stronger road can be made for the same money than the light and flimsy patterns in use. The inventors have sample lengths of line giving great satisfaction in other parts of London and Great Britain, and are now carrying out some large orders. This rail seems to supply a want in tramway roads, and is now being adopted so freely as to in-

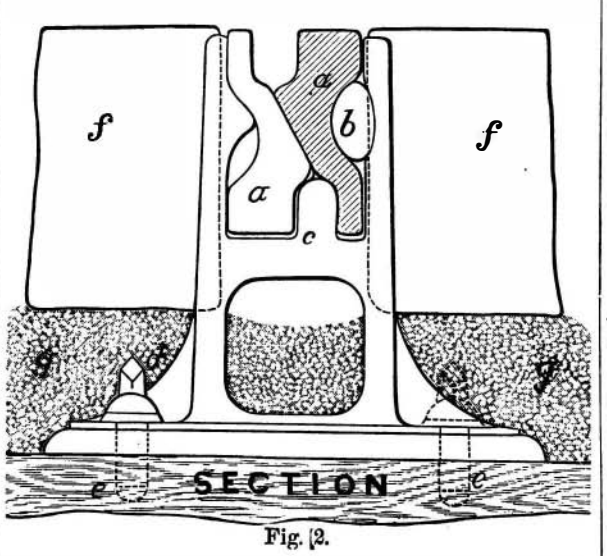


Fig. 2.

duce the belief that the owners of tramways recognize in it a remunerative successor to the old rail.

Gas and Water Tight Cloth.

Dr. Hirzel, of Leipsic, has recently patented in Germany gas and water tight cloth, which he makes, according to the *Manufacturer and Builder*, by placing a large, smooth piece of so-called gutta percha paper between two pieces of a not too coarse and dense material, for example, shirting (undressed), and then passing the arrangement between heated rollers. The outer pieces of shirting combine in the most intimate way with the inclosed gutta percha to form a material which is impenetrable by gas and water. It may be made still denser and more resistant by being coated on both sides with copal lac. The substance is conveniently flexible, and will remain proof against variable influences of weather and external temperature. It can be applied to all those purposes for which waterproof material is used, and it is well adapted to form gas tight membranes for regulators of pressure of compressed gas, bags or sacks for dry gas meters, and also dry gas reservoirs.

The objection, however, is that gutta percha is an unstable substance, which cannot resist the ordinary atmospheric influences for more than a few years, during which time a gradual oxidation makes it at last hard, brittle, porous, and finally utterly worthless. India rubber is better in this respect, as it lasts longer, but this also gives out at last.

[If the above invention is applicable for gas tubes, or if any one can invent a flexible tube for conveying gas which will prevent the latter from extruding through the pores after short use, it would be very desirable.—ED.]

American Society of Civil Engineers.

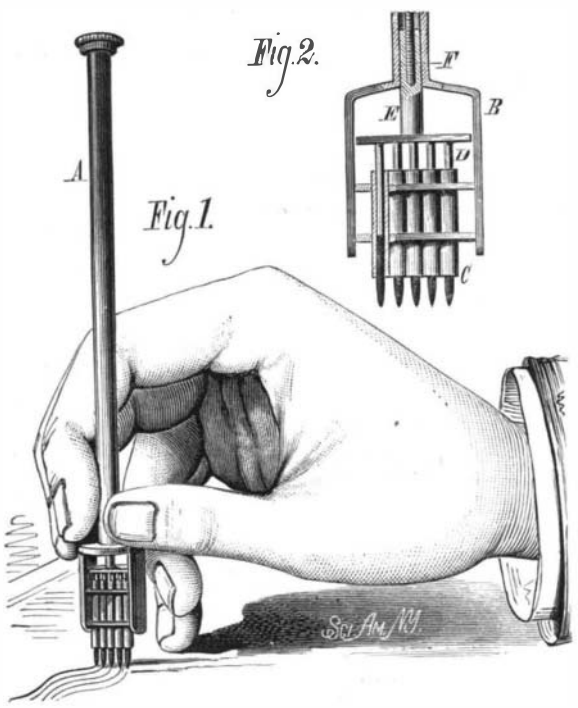
At the recent annual meeting, New York, the following persons were elected officers of the American Society of Civil Engineers for the year beginning November 6th, 1878:

President, W. Milnor Roberts, Vice Presidents, Albert Fink, James B. Francis; Secretary, John Bogart; Treasurer, J. J. R. Croes; Directors, George S. Greene, William H. Paine, C. Vandervoort Smith, Thomas C. Clarke, Theodore G. Ellis.

A NEW DRAUGHTING PENCIL.

The accompanying engraving shows in perspective in Fig. 1, and in section in Fig. 2, a novel draughting pencil, recently patented by Mr. F. W. McGee, of Rutherford, N. J.

It is especially designed for drawing parallel lines to represent the coast or shore in map drawings; but it is applicable to various other purposes.



McGEE'S DRAUGHTING PENCIL.

Its construction will be clearly understood by reference to Fig. 2. A is a tube, having at its lower end a fork, B, which supports a number of tubes, C, for containing the leads. Several wires, D, project into these tubes, and are attached to a rod, E, that slides in the tube, A, and is adjusted by the screw, F, whose milled head is at the top of the tube, A.

Lines of different shades may be produced by using leads of different degrees of hardness.

A New Use for Warts.

Dr. Charles A. Seale, of this city, announces in the *Medical Record* that warts of the hand can be used with better results than small pieces of normal skin, in skin grafting, in consequence of being easily separated, uninjured, into numerous cylindrical rods of great vascularity, and containing a large proportion of hypertrophied epithelium, which, when planted in healthy granulating tissue, readily adapt themselves to the new soil, receiving direct nourishment, and quickly growing as starting points for a new and smooth epithelial covering.

In one case, in which there had been complete destruction of all the skin on the dorsum of the foot, involving to a great extent the deep cellular tissue, and where for several weeks no healing advanced, grafts of freshly removed warts from the patient's hand immediately started little islands of new tissue, which rapidly increased, until they coalesced and met the margins of the border skin, thereby completely covering the foot by firm, protecting integument.