# Schools of Special Instruction for Employees Multiply in Big Cities

BTON, Sept. 25.-The American B public school system is being diversified as never before, and mostly in practical directions. In several cities of the country, high schools of mechanic arts and commerce have opened this fall with largely increased membership. It is a comparatively new thing with us for the state to undertake such work, and the commercial high school is particularly an innovation. The High School of Commerce of the city of Boston. now entering upon its second year, is a case in point.

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The state's embarking in business schooling, as it may be called, in, like many other of the best things the state does, only following in the footateps of progres-American citizens of private life. The merement toward popular-in trial education has been gaining strength stendily for many years past. In this state ten or a dozen years ago schools with elementary and advanced technical courses were opened by the textlle manufacturers of New Bedford, Lowell and Fall River, with the aid of the state and city. The textile school in Philadelphia dates back to the same impulse. Bo well worth while did the idea immediately prove itself that other places and other lines of industry began adopting It without delay. In several southern cities manufacturers have established technical schools in order that ambitious young men and women need no longer go north for their training.

Even in business lines where the principle is not so broadly applicable modified forms have been introduced, until today there are perhaps a hundred large commercial and manufacturing concerns that maintain, at considerable expense, training courses in one branch or another of their business. Life insurance companies, for example, long ago began to educate young men in the art of approaching prospective customers. Now the salesmanship class is a feature lof the office organization of a large proportion of our big wholesale houses and not a few big retail stores, while in some cities free evening classes in the same subject have been established by the school boards.

The quasi-public services have special need of industrial education, and it is natural that they should be leaders in its development. That American public service in general has attained its position as the best in the world-and fair-minded foreign observers acknowledge that it has reached that eminence-is due to its having been made a profession in the true sense of the word, not only for those who manage it, but even for those who operate it in humbler positions.

The task of a locomotive fireman, for instance, seems to be merely that of shoveling coal into the fire box and regulating the draught. But the cost of teaching him how to do these things scientifically has been saved many times over in the fuel economy it has paid for. The train hands must deal with passengers courteously and discreetly; in the interest of speed, safety is the most intricate and delicately adand comfort of travel he must know many unsuspected mechanical details; so the big and the volume of traffic it handles day in railroad systems maintain instruction cars and day out is enormous-beyond what most that travel back and forth over the lines, people realize. Besides the telephone is restopping at division points for a few days sorted to in haste and frequently under at a time to teach beginners and brush up stress of emergency, when every second of

the knowledge of the older hands. waiting seems an elernity and the most The lighting companies used to depend necessary question an impertinence. Added of 16 teaching in the United States is in involved is of the most intimate kind.



STREET RAILWAY EMPLOYES GET LESSON IN DEPORTMENT.

Street railroad and telephone service have automatic machine ever devised fails to do operators could give no attention to trainthe personal equation, the "human element," is constantly present. Electricity telephone system, the machinery of which people an entirely new set of conditions to telligence than does anything else that board. The lines there could not be condeal with. Speedier transit only increased works with such mechanical precision, and, the hurry of the traveling public. It made contradictory as it sounds, he forgets it it necessary that motormen, conductors, because he knows that in spite of its meand their zrethren of the third-rail train, chanical precision the telephone system is the switchboard, and the next step was to should have a working familiarity with a most dependent for smooth running on its utilize discarded apparatus' for practice diversity of electrical equipment and the human parts.

watchful diplomacy of a minister plenipolarger cities have training courses to teach good relations with the public has led the the motorman on the surface or elevated line how to mote and the conductor how to conduct himself; and in all these educational schemes almost the most important feature is that of "dealing with the public." The proposition before the transportation manager in maintaining good relations with

the public through his employes is simple compared with the telephone manager's "stunt." In the first place very little of the physical plant required for giving telephone service is visible to those who use it, and that little is, of course, the simplest part. The central office plant, which justed agency we employ in modern life,

largely on technical schools for their to these difficulties is the fact that though trained men. But it is a curious fact that, the public and the telephone operator never though gas has been in use in this country actually meet face to face, they are in a half century as an illuminant, and a much closer touch than the public and the quarter century as power, gas engineering street car conductor, say, while their deal- dition, gave such snatches of instruction calls, and so on-these are a part of the

delphia, at the headquarters of the The result of being thus "so near and that it was likely to perpetuate the techni- teaching things of this sort, and special change. Physicalephia, at the headquarters of the The result of being thus "so near and that it was nearly to perpetuate the teaching the for the practice board work. The operating school makes "Central" a subclated companies which operate the yet so far" is that the telephone user comes cal faults of the old operators, while it stress is laid on the practice board work. The operating school makes "Central" a plants of a score of western cities as well to think of the operator as a part of a did not necessarily inculcate their virtues; in which teachers, representing for the time specialist. Her speciality is doing everyone "defective" call in every 20,000 that are port of the pres t toward bet as the huge system of the City of Brotherly great mechanism. The man who deals with neither did it make for uniformity. And being the public, try to give the would-be thing with the utmost exactness, that she made, as the records of Bell exchanges in ter and broader industrial and mercantile machinery knows that even the most exact when traffic increased so that the regular operators vivid experience in wrestling may be eternally courteous, that all cus- large metropolitan centers show the pro- schooling.

particularly difficult problems, for in them perfect work sometimes. Yet he is prone ing novices, special instructors will apto forget that fact when he deals with the pointed. For awhile, the instructors taught their as a motive power gave the transportation requires more human manipulation and in- pupils at spare positions at the switch-

The great importance of the operator in

tentiary. So the street railways of the giving satisfactory service and maintaining telephone companies further into the field of industrial education than the other public services have gone, probably. They have to teach, besides the skillful manipulation of apparatus the art of good business dealing. The part the telephone user may play in making his own service satisfactory to himself is evident, and in order to make it as easy as possible the different companies of the national system have adopted uniform practice in operating methods varying only slightly, even in such details as phraseology, to meet the peculiar requirements of the different sections of the country. Probably the Bell engineers have made a closer study of industrial training than has been made in any other industry or by any other group of men. They were ploneers in the work and they are still among the leaders in broadening and extending it, though their general methods have been well shaped

> for some years. Obviously, it was necessary to train telephone exchange was opened. In the

purposes. But this also was soon out of the question, for the evolution of telephone. equipment in the thirty years since Bellinvented the instrument has been extraordinarily rapid, and the central officeapparatus of today may be largely out of date tomorrow. So, a number of years ago, a school of telephone operation,

nected to anything, though, and about all

that could be done was to show how they

were handled. Growth began to crowd

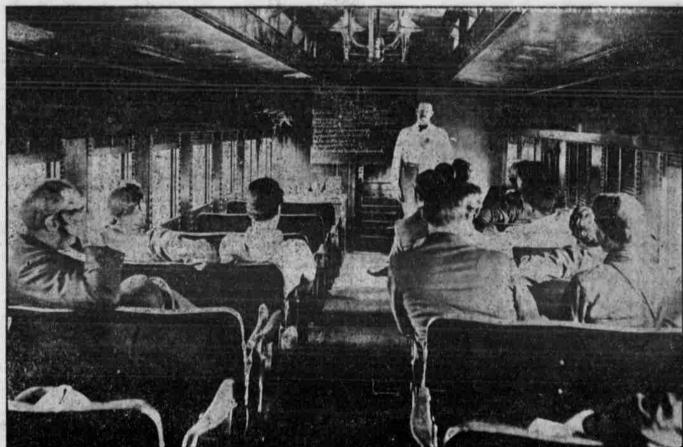
equipped and conducted solely for teaching candidates for switchboard work, was established in New York. Now the Bell companies have similar schools in all the larger citles and instruction classes in many of the smaller telephone centers, while traveling instructors take care of the needs of the little offices that require only occasional attention of this sort.

In the Bell operating schools the young woman are given first a working knowledge of the details of the apparatus they employ, that they may use it intelligently. Then the methods of actual operation are taken up and taught by lectures, charts, and experience at practice switchboards, The phraseology to be used in all the different situations that arise, and the reason

why each phrase is employed rather than any other; the methods of "trunking" telephone operators from the time the first from exchange to exchange; handling toll and long distance calls, and operating coinearly days beginners learned by observing in-the-slot pay station service; the treatthe work of experienced girls, who, in ad- ment of requests for information, emergency is almost a new science, and the real center ings are all conversational and the service as there was time for. There was one general education of the telephone girl. great objection to this scheme, however, Practice is more important that precept in



TELEPHONE OPERATORS RECEIVING INSTRUCTIONS



RAILROAD FIREMEN BEING INSTRUCTED AS TO MYSTERIES OF COMBUSTION.

with the problems they will find themselves tomers may be treated alike, and that noth- portion to be. But what degree of perfecfacing later on in the regular ex- ing but unavoidable mechanical difficul- tion has been reached is a matter of educaties' may interfere with the speed of the tion of the most painstaking kind; and this The operating school makes "Central" a service. It cannot be helped that there is is one of the strongest arguments in sup-

## Egypt's Great Dam at Assouan Which is to Be Raised Fifteen Feet

by the ancient Egyptians, just below the Island of Philae, with its stone temples built ages ago to the Goddess of Isis, far up the Nile valley, on the edge of Lower Nuhia. I write these notes for my American readers. I am in the heart of the desert. the miles south of the Meditesranean sea, at ley gets its rich feed of Abyssinian mud. over the first cataract. I have come here to describe the Assouan dam, which the British have built to harness the Nile and thereby to save Egypt from famine.

#### , Nile in Harness.

rivers, but the Nile god of 1907 has many subside the waters grow clear again. The case during the neven hungry years of flood,

Joseph's time, and the fat years of that day For thousands of years these rivers years something like \$50,000,000 has been SOULT.

### How Egypt is Watered.

But first let me tell you in a nutshell most rainless and the Nile gives both land and people their food and drink. You have card of the wonders of the stream itself. It is, with the exception of the Missizelppi, the longest river of the world. long that if it were stretched out in one might line it could reach from the great Altes to the Gulf of Mexico, and then turnor, cross our country from the Atlantic to the Pacific. It rises in Lake Victoria, in the heart of Central Africa, and drops a distance greater than the altitude of the highest of the Alleghenies before it flows into the Mediterranean sea. During the upper part of its course it is known as the White Nile, and this should be called the main stream of the river. At Khartum, 1,350 miles from the Mediterranean, the Ithre Nile, which rises in the Abyssinian countains, comes in, and about 140 miles further north the Atbara, or Black Nile, which also is from Abyssinta, joins the main stream. From the mouth of the Atbara to the sea there is not a branch or stream of any kind connected with the river. It plows its way through the desert valley, in which it has built up Egypt. narrowing and widening, until a few miles below Cairo, where it divides into two great branches and flows off into the Mediter-

that the water can be let in and out and allowed to pass through at will.

#### Nile Flood.

It is at flood time that the Nile valit drops a great deal of sediment and the point where the great river drops down This is brought down in part by the furnishes enough moisture for the crops. Blue Nile, but more abundantly by the Atbara or Black Nile. It is carried by the floods all over Egypt and by means of irrigation canals and by various pumps, some worked by men, some by animals and some by machinery. It is conducted We all look upon this as the oldest of to nearly every farm. After the floods

Holland. new aspects. For ages it has been ramp- Blue Nile and the Black Nile become and charging at its own sweet will, almost dry, and the white water of the but it is now being harnessed and will main or Victoria Nile is about all that have to work in the traces like an old plow Egypt has. It is this white water that mule. In the past it has been feeding its is stored up by the Assouan dam, and daughter Egypt or not, as it pleased. It it feeds the country in much the same has sometimes studied it to repletion, and way as our irrigation canals do, with at others has held back its supplies of water water only and not with a thick mixture and mud, causing a famine. This was the of water and mud as in the times of the

were undoubtedly produced by high Niles, have been pouring down through this Such changes have occurred in Egypt from Nile valley; but whenever the rains have time to time since the days of pyramids, been scanty in the highlands of Abysand it is only within the last generation sinia, and in central Africa the main that man has attempted to control the old stream has not been high enough to reach river and by a system of dams to hold the whole country. The most of the back the waters and let them out over the lands could be flooded only once a year, farms as needed. Within the last twenty and if the Nile was especially low some could have no water at all. By the new spent in this way, and there are now great system it is planned to give Egypt water barrages at Cairo, at Assiout, and, more all the year round and to supply enough important than all, away up here at As- to make it produce two or three crops every year.

#### Vast Series of Basins.

I have been much interested in the irrihow Egypt is watered. The country is al. gation works of the past. The whole of most rainless and the Nile gives both land the Nile valley above Cairo is cut up into a series of basins. For 600 or 700 miles north of this point the valley slopes very gradually and, in order to save the water, dikes have been made across it and embankments run parallel with the river, turning the whole country into a series of basin-like terraces. Each basin contains from 5,000 to 15,000 acres, and the dikes are such that the water has to flow from basin to basin, between the Nile embankments and the walls of the desert, so that none of it is lost. These basins are often subdivided, and they are so connected that the water flows from one to the other and finally passes out of the lower basin back into the Nile, When the floods come, the lowest basins are filled first and then those higher up, until at last all have become great ponds and Egypt is one vast inland sea cut up by the embankments and islands upon which the villages stand.

There are forty-five such systems of basins in upper Egypt, some large and some small. There are also basins higher up closer to the river which are filled with sakiyehs or shadoofs, rude irrigation pumps worked by animals and men. When I tell you that the fail of this valley from here to Cairo is only seven inches to the mile you will see how carefully these basins The volume of the Nile is onormous. must be graduated in order to take ad-

wormy and the crops are often sown too late. The red water, or that containing to extend it to the farms of upper Egypt. the silt, is allowed to stand on the land just about forty days. During this time

The Assound Dam. The Assouan dam is one of the wonders

of modern Egypt. It is in full sight of me as I sit here on the left bank of the Nile.

with the desert at my back. It looks like Few people have any idea of the work a great stone viaduct crossing the rocky the Egyptians do in irrigating and taking bed of the river joining the stony hills care of their farms. The task of keeping which wall the Nile on both sides and these basins in order is herculean. As the holding back a portion of its mighty waters. Nile rushes in, the embankments are it is a great granite wall, eighty-six feet watched as the Dutch watch the dikes of wide at the bottom and twenty-six feet They are patrolled by the vil- wide at the top, rising 120 feet above the lage headmen, and the least break is bed of the river, being a mile and a quarter by these gates. filled with stalks of millet and earth. The in length. There is now a roadway guarded village officials have the right to call out by walls on its top, and there is a little the people to help, and no one refuses. If car line, the wagons of which are pushed the Nile gets too high it sometimes over- by men, which runs over it, from one side dam, but always through the gates and the flows into the villages and the mud buts to the other. The dam serves as a bridge canal at one side. When the gates are crumble. During the flood the people go as well, and donkeys, camels and men aro closed during the dry season enough water about in boats from village to village. allowed to pass over it from bank to bank. is held back by this structure of steel and

and camels. came behind on the trot. The people sow their crops as soon as

Exypt in Flood Time.

the floods subside. Harvest comes on time to examine the construction. The dam In order to appreciate the strength of

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MR. CARPENTER CROSSING THE DAM.



WATER BELOW THE GREAT DAM.

HELLAL, Nubla.-(Special Corre-spondence of The Bee.)-Within a fiver then rises twenty-five feet at Cairo, be drained off as rapidly as it is let on. Nile floods, they must wait until the fol-states. They are beautifully cut and fitted the reservoir is full the water in it masonry was raised. The dam itself conmile or so of the red granite thirty-eight feet at old Thebes and al- The Abyssinian mud contains a great deal lowing year before they can plant again. as closely as the walls of a palace. On amounts to almost a quarter of a trillion tains more than 1,000,000 tone of granite and quarries, out of which Pompey's most fifty feet at the first cataract, where of salt, and it is just as bad to have If they can have a dam like this at As- the upper side or north face the wall is gallons. It contains 234,000,000,000 gallons about 15,000 tons of steel, and the calculapillar and the obelisks were taken I now am. There is so much water then too much of it as too little. If the land is souan, the Nile can be kept high through- perpendicular, forming a straight up and and weighs over 1,000,000,000 tons. It tions of the engineers are such that they that no dam could held it, and all of over watered the saits dissolve from the out the year and they can grow crops the down barrier against the waters of the is so heavy that if it were loaded know just how much water every ounce of these great works have to be made so soil and the over-soaked land becomes year round. This is already the condition Nile. I climbed down a ladder on that side upon wagons it would take two billion stone and steel will held back. They know in a great part of the delta, and it is simed at one place almost to the river, and could horses to haul the load. We have in the the exact weight of the river at every hour see that the blocks are fitted so closely that United States something like eighteen mil- of the day, and they have telegraphic rethe cement does not show. The wall seems lion horses. One hundred times that ports which tell them what the Nile is doalmost one solid stone throughout, with the many, all harnessed together and all pull- ing in Abyssinia. In Central Africa and the exception of where the great sluices are ing at once, could not carry the weight Soudan. They have dispatches as to every

the times of the flood, and as the floods back. subside to shut back the waters to form If the water could be loaded on freight that they can tell how much or how little the great reservoir for the dry season.

as much or as little as the engineers will, the moon, The dam is thus a great stone wall pierced There is water enough in the reservoir to only at Assouan, but all along the great

### One Billion Tons of Water.

The Nile never flows over the top of the The donkeys, buffaloes and bullocks live I crossed on the car at a cost of 25 cents, granite to form a lake 140 miles long, and on the dikes, as do also the goats, sheep "my motive power being two Arab boys who this is let out as needed to supplement the ordinary flow of the river and give the

As I came over I stopped from time to crops plenty of water all summer through.

cut, to allow the river to flow through at which this masonry is required to hold great rain, and they know to a ton just

team being given a width of eight feet and Egypt possesses. a length of forty feet on a roadway, the

line of teams required to carry it would be a half mile wide and would form a I am also amazed at the strength and solid train of that width circling the globe delicacy of the machinery of this remarkat the equator.

every day.

Greater Than the Pyramids, was made by forced labor and it impov- a single man. erished the people. The dam cost alto- This thought was impressive as I sat of the Nile.

water stored and double the benefit.

#### Wonder of Mechanics.

The Assouan dam is more wonderful than of the Nile, lifting stones weighing many the pyramids in its mechanical construc- tons and carrying them some distance down the desert on a solid stone platform, and it of this nature that a cement foundation is little more than the piling of one stone has now been made below the dam itself upon another. For the Assouan dam a in order to prevent the gouging out of the srench 100 feet wide and 100 feet deep had bed and thus undermining the main struce to be excavated in the granite rock; it had ture,

how much water lower Egypt is using, so

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cars at one hundred tons to the car, it to let out for the farms. They even estimate There are 180 of these sluice gates in the would take ten million cars to carry M. the force of the sun on the water and know dam, each of which has steel doors that and if each car were forty feet long, the how much it drinks up every day. When can be raised and lowered to allow the train would reach eighty thousand miles. the reservoir is full Old Sol takes 1,599,092 whole river to flow through or to hold back or one-third of the distance from here to tons from it every twenty-four hours, and the engineers estimate the evaporation not

give all the families of the United States stream and throughout its swamps to its all they could use for six or eight months, source in Victoria lake. I have had some and enough to supply Great Britain and talks here with Mr. McDonald, the engi-Ireland for the year round. If the water neer-in-chief of the dam, and am surprised were loaded on two-horse wagons, each at the wonderful intelligence bureau which

### What a Child Can Do.

able structure.

The weight is, indeed, studendous and It is so arranged that a child can operthe force inconceivable. Nevertheless, dur- ate it. The great sluice gates are each as ing the floods fully as much water runs high as a two-story house, and so wide through the dam every day as the whole, that you could drive a hay wagon through supply kept back in the dry season; and them without touching the walls. They the structure had to be made so that it are cut right through the granite dam and would retain this huge lake and at flood are closed or opened by steal doors, which time let a lake equal to it pass through move up and down inside the wall on rollers. Upon the top of the dam there

are machines for moving these gates, and they are so made that a child could oper-Talk about the Pyramids! The Assouan ate them. They are so equipped that they dam is far more wonderful than they, can be moved by electricity, but they are The Pyramid of Cheops required 100,000 now worked by hand, and this mighty men and thirty years in its building. The force, so great that 2,000,000 horses Assouan dam was constructed by about would be required to move it, is now con-11.000 men in four years. The Pyramid trolled at will by the muscular power of

gether about \$12,000,000, and the men who below the dam, right where the eight cenworked upon it were better paid than any trai sluices pressed onward by the mil-others who have ever labored in the valley lions of tons of water lying behind them pour forth their mighty flood. I had

Moreover, the dam has made Egypt the climbed down the steps at the north side most prosperous country of the world. It of the center of the great structure to has added to it more than 1.500,000 acres make a photograph of the stream flowing of tillable land and has increased its through. They come forth with a rush crops to a value of more than \$12,000,000 as great as that of Niagara and go foaming per annum. It has more than paid for over the rocks with a force that might its cost every year. Since it has been generate thousands of horsepower. That built the yearly taxes have increased \$2,- noise is like thunder and the streams fairly 609,699; and the lands owned by the gov- shake the earth. Each is about fifteen ernment have become worth \$5,000,000 feet in height and is as yellow as mud. more. By the raising of the dam, as now There were eight such streams of golden planned, there will be an enormous ad- foam at my right, and further over I ditional increase. The scheme decided could see the spray from others all dashupon is to raise the dam fifteen feet. ing through the dam until they met in a This will almost double the amount of yellow foaming mass several hundred feet below me and rolled onward down the

rocks to Egypt. They flow out with such a force that they tear up the rocky bed Old Cheeps is built on the edge of stream. -They have done so much damage FRANK G. CARPENTER.