

wood relates that, some years ago, upwards of £100,000 were lost through the partner of a large establishment in England lighting gas with a piece of paper, which he threw away, and thus set fire to the premises, although it was a strict rule in the place that gas should only be lighted with tapers, which were provided for that purpose.

It is hardly necessary to dwell upon the more obvious causes of fire common to all structures—such as carelessness in the use of matches, and the dropping of fire from unextinguished tobacco—the latter a constantly occurring source of conflagrations, figuring largely in the causes of fires in London; the ratio of fires for a series of years from this cause, as compared with those from spontaneous combustion, being as 166 to 43. The smoker's match, carelessly thrown away, has become a social nuisance, the great source of general conflagrations now-a-days. One insurance company in London has lately reported that its losses by lucifer matches alone amount to not less than £10,000 annually.

Special notice should be taken of a hitherto unsuspected cause of fires in mills, first noticed by the eminent mill engineer, Mr. James B. Francis, who describes, in a communication to the *Journal of the Franklin Institute*, the circumstances of the ignition of pine timber in the Appleton Cotton Mills, in 1864, through electrical sparks communicated from a rapidly moving leather belt. The belt was driven by a drum eleven feet in diameter, having iron arms and wooden lagging, making ninety-two revolutions, and transmitting a horse-power estimated at one hundred and seventy-five. The pulley driven by the belt was six feet in diameter, and entirely of iron. The peripheries of both drum and pulley were covered with leather. The belt was made of two thicknesses of leather cemented together, and about three eighths of an inch thick. It had been slightly greased on the inside seven or eight weeks before the fire with a mixture of tallow and neat's-foot oil. The part of the belt near the timber was the slack side, running nearly vertically, and at the nearest point was about eight inches from the timber. When it was first observed by Mr. Francis, a constant stream of sparks was passing between the belt and the corner of the timber which had been on fire. The charred timber indicated that about six inches of the corner had been on fire.

The electrical excitement in the mill on the day of the fire had been unusually great, although electrical phenomena, frequently observed in cotton and woollen mills, usually attract but little attention.

Mr. Francis observes that it is not unfrequent to find, on the belt boxes of a mill, an accumulation of flyings of cotton or wool covering every thing not in rapid motion, to a sensible depth. In this case the belt box was very clean, to which fact he attributes the slow progress of the fire, and the detection of its cause. He also remarks "that by the light of the fire at the Appleton Mills, it appears probable that many other fires which were totally inexplicable at the time of their occurrence, may be attributed to this cause."

[From Hours at Home.]

FIRST WEEK OF THE TELEGRAPH.

In the fall of 1850, Mr. Alfred Vail, of Morristown, N. J., gave the writer an account of the receipts of the telegraph at the Washington office during the first four days of its operation, after it had been taken under the patronage of the Government, and at his request, Mr. Vail afterward wrote it down. That record is now before him, and from it the present statement is made, mostly in the words of the manuscript.

The telegraph was first put in operation, between Washington and Baltimore, in the spring of 1844, and was shown without charge until April 1, 1845. Congress, during the session of 1844-'45, made an appropriation of \$8,000 to keep it in operation during the year, placing it, at the same time, under the supervision of the Postmaster General. He, at the close of the session, ordered a tariff of charges of one cent for every four characters made by or through the telegraph, appointing also the operators of the line; Mr. Vail, for the Washington station, and Mr. H. J. Rogers, for Baltimore.

This new order of things commenced on April 1, 1845, and the object was to test the profitableness of the enterprise. The receipts for April 1-4, inclusive, were as follows:

It should be borne in mind that Mr. Polk had just been inaugurated, and, as is always the case on the advent of a new Administration, the city was filled with persons seeking for office. A gentleman of Virginia, who stated that to be his errand to the city, came to the office of the telegraph, on the 1st day of April, and desired to see its operation. The oath of office being fresh in the mind of the operator, and he being determined to fulfill it to the letter, the gentleman was told of the rates of charges, and that he could see its operation by sending his name to Baltimore, and having it sent back, at the rate of four letters or figures for a cent; or he might ask Baltimore regarding the weather, etc. This he refused to do, and coaxed, argued, and threatened. He said there could be no harm in showing him its operation, as that was all he wanted. He was told of the oath just taken by the incumbent, and of his intention to serve it faithfully; and that if it was shown to him by the passage of a communication gratuitously, it would be in violation of his oath of office. He stated he had no change. In reply, he was told that if he would call upon the Postmaster General and obtain his consent that the operation should be shown him gratis, the operator would cheerfully comply to almost any extent. He stated in reply that he knew the Postmaster General, and had considerable influence with some of the officers of the Government, and that he (the operator) had better show it to him at once, intimating that he might be subjected to some peril by refusing. He was told that no regard would be paid to the extent of his influence, etc., be it great or little; that he did

not think he was at liberty to use the property of the Government for individual benefit when under oath to exact pay; and cited the rules of the Postoffice in relation to the carriage of letters; but that he was willing to do as directed by the Postmaster General (Hon. Cave Johnson). The discussion lasted almost an hour, when the gentleman left the office in no pleasant mood.

This was the patronage received by the Washington office on the 1st, 2d, and 3d of April. On the 4th, the same gentleman "turned up" again, and repeated some of his former arguments. He was asked if he had seen the Postmaster General, and obtained his consent to his request; to which he replied he had not. After considerable discussion, which was rather amusing than vexatious, he said that he had nothing less than a twenty-dollar bill and one cent, all of which he pulled out of his breeches pocket. He was told that he could have a cent's worth of telegraphing, if that would answer, to which he agreed. After his many maneuvers, and his long agony, the gentleman was finally gratified in the following manner: Washington asked Baltimore, 4, which means, in the list of signals, "What time is it?" Baltimore replied, 1, which meant "1 o'clock." The amount of the operation was one character each way, making two in all, which, at the rate of four for a cent, would amount to half a cent exactly. He laid down his cent, but he was told that half a cent would suffice, if he could produce the change. This he declined to do, and gave the whole cent, after which, being satisfied, he left the office.

Such was the income of the Washington office for the first four days of April, 1845. On the 5th, twelve and a half cents were received. The 6th was the Sabbath. On the 7th, the receipts ran up to sixty cents; on the 8th, to \$1.32; on the 9th to \$1.04. It is worthy of remark, concludes Mr. Vail, that more business was done by the merchants after the tariff was laid than when the service was gratuitous.

The above details may strike many as very trifling and undignified. So they are, in themselves; but therein consists their charm and their relevancy to the subject in hand. Deep in our nature there is a principle that loves to contrast small beginnings with grand results. History is full of this. Development is characteristic of the works of God, and of the works of man as well. Nothing great ever comes all of a sudden. To the ignorant and unobservant it may seem so, but it only seems, for it is not so. It was not thus with the commonest implement of the peasant—the plow, for instance. Only of late has this—the pioneer and the honored symbol of civilization—risen to its present advanced degree of improvement, for doubtless it has not yet reached perfection. So of every other in the service of man. The telegraph is but a particular instance of a general law—development. To note a single point in its germ-period was all that the writer proposed to do.

As a finale to this humble scrap of history, it would seem to be eminently fit to reproduce a relation made by Professor Morse, which will explain itself. It may be proper to add, however, that the date of the midnight passage of the Telegraph bill must have been in May, 1843, as the passage of the dispatch suggested by the lady friend of Mr. Morse was on Monday, May 27, 1844, which, he says, was about a year after the law was passed.

Says Professor Morse: "My bill had indeed passed the House of Representatives, and it was on the calendar of the Senate; but the evening of the last day had commenced, with more than one hundred bills to be considered and passed upon before mine could be reached.

"Wearied out with the anxiety of suspense, I consulted one of my senatorial friends. He thought the chance of reaching it to be so small that he advised me to consider it as lost. In a state of mind, gentlemen, which I must leave you to imagine, I returned to my lodgings to make preparations for returning home the next day. My funds were reduced to a fraction of a dollar. In the morning, as I was about to sit down to breakfast, the servant announced that a young lady desired to see me in the parlor. It was the daughter of my excellent friend and college class-mate, the Commissioner of Patents (Henry L. Ellsworth). She had called, she said, by her father's permission, and in the exuberance of her own joy, to announce to me the passage of my Telegraph bill, at midnight, but a moment before the Senate's adjournment!

"This was the turning point of the telegraph invention in America.

"As an appropriate acknowledgment for the young lady's sympathy and kindness—a sympathy which only a woman can feel and express—I promised that the first dispatch, by the first line of telegraph from Washington to Baltimore, should be indited by her. To which she replied: 'Remember, now, I shall hold you to your word.'

"In about a year from that time, the line was completed, and everything being prepared I apprised my young friend of the fact. A note from her inclosed this dispatch:

'WHAT HATH GOD WROUGHT!'

"These were the first words that passed on the first completed line of electric wires in America. None could have been chosen more in accordance with my own feelings. It baptized the American Telegraph with the name of its author."

NITRO-GLYCERIN.—Sometime since, in alluding to this destructive agent, we urged that its use should be prohibited by law. This subject is now being discussed in Europe; and in Sweden, where the article first made its appearance for blasting purposes, its use has been prohibited, and also in Belgium. The *Scientific Review* calls upon the British Government to follow the same example as a truly humane and praiseworthy act.

ENGLISH IMPROVEMENTS IN SMELTING IRON ORES

An ironmaster of Wolverhampton, England, writes to the *Ironmonger* of improvements now in operation in the Cleveland district, as follows:

"On entering the Cleveland ironmaking district any one from Staffordshire must be struck with surprise that not a flame is to be seen coming from any of the furnaces, except at intervals for a few moments. This is consequent on their way of utilizing the tunnel head gases. They close the throats of their furnaces by means of two castings, a cap and a cone. The cap, which is rested on the brick work of the furnace, has no bottom, but the opening is filled by a cone held in its place by machinery so arranged that when the cap is charged it can be lowered, and so permit the materials so charged to escape into the furnace. The Cleveland ironmasters, most of them, think that a better distribution of materials is insured by this mode of filling, and that it is an easy and inexpensive way of collecting the tunnel head gases. We, however, in Staffordshire, who use the gases, do not agree in thinking a close top at all desirable or attended with a saving of expense in the long run. In the first place, it actually prevents the furnace from being filled by some feet, in order to lower the cone, and also it is impossible to know, without going on to the furnace top and feeling with a rod through a hole made for the purpose how far the furnace is from being full, and as nothing tends to regulate the quantity of iron made more than keeping a furnace filled to one exact height, this is an objection. The gases, where the top is closed, are usually blown by force of engine, not only through the materials in the furnace, but into and out of the gas pipes, of whatever length, size, or shape may happen to be the firing furnaces, flue, and indeed the chimney tops. The back pressure caused by this is very objectionable. We prefer to exert, by means of a good chimney, such an amount of suction beyond all firing places as to draw the gases, or their products of combustion, from the furnace into the mains, and on through firing places and flues by its very suction, thus rather encouraging the furnace to drive, instead of by back pressure tending to hinder the driving. Another advantage of the open over the close top is that the gas being drawn off is included to mix with the air necessary for combustion, whereas in the other case it comes off at a pressure, and consequently is not so inclined. From being at a pressure it is liable to leakages, and may accumulate, so causing explosions, whereas, wherever it is drawn through a leak, it will, by the same power, be carried on into the chimney, and so rendered harmless. I am pleased to be able to state that one Yorkshire firm work our open-topped system and, in spite of all they hear from Cleveland ironmasters and managers as to the superiority of closed tops, after years of experience in working open ones, having just raised one of their furnaces very considerably, they have again applied our open top system, which they informed me works admirably.

INCREASED HEIGHT OF FURNACES.

"The point, however, in which nearly all the Yorkshire furnaces, especially the most improved, differ most widely from ours is in their great height, also in width of bosh. Six years back furnaces were built in Yorkshire very much as they were in Staffordshire, and at that time their yield of fuel varied from thirty to thirty-six cwt. of coke per tun of iron made. At the present time the heights of furnaces vary from seventy-five to one hundred and five feet, while boshes are of all dimensions, from sixteen to thirty feet. Their yields of coke, too, have varied with the increased height of furnace and diameter of bosh to an average varying from twenty-eight cwt. down to sixteen cwt., if not lower. These increases to both height of furnace and width of bosh have taken place so simultaneously, and the temperature of blast has also been so increased during the same time, that it is very difficult to decide to which of the improvements the better yield of coke is chiefly due. I should have felt very doubtful on this point myself, had it not been that Mr. Horton, of Lilleshall, has raised his four cold blast furnaces at the Lodge twenty feet without increasing their size of bosh, and thereby saves seven cwt. of coke to the tun of iron. This height of furnaces I consider to be the most important question for Staffordshire. Are we using, say five cwt. to the tun more coal than we need, if only our furnaces were raised a few feet; in other words, where about thirty-five cwt. of coal are used might we do with thirty? If so, at a make of 150 tons of iron per week, and charging the coal as worth 8s. per tun delivered into the furnace, the saving would amount to £780 per year per furnace. If we could get rid of coal or coke, the quality of resulting iron must be improved, as coal or coke is the great sulphur carrier. There are over-careful ones who are not inclined to look favorably, or even hopefully, on any improvement that is likely to necessitate a change in their plant, as it now stands; and others, from opinions formed, I consider erroneously, say, "But our coal or coke is too weak, and would be crushed by the increase of height of column of measures charged." I answer, it has not proved to be so in Shropshire, nor is the cold blast prevented from entering the furnace, though blown at the same pressure and in the same way as before; namely, about 31 lbs. pressure through the leather bags and open muzzles, usual in cold blast furnaces, into the cold blast furnaces, muzzles not even jointed into tweers. I firmly believe that our furnaces, and coal, or coke, will bear increased height, provided they are not made much wider. Indeed, I consider that increase of height does not to any very great extent increase crushing weight, as the materials rest at the bottom on the bosh, which causes those above to carry themselves to a very great extent against the sides. It is well-known that if you fill a tube with very fine materials the downward pressure is not anything like equal on the bottom or any other part of