THE FIRE RISK OF DEFECTIVE FLUES.

As the weather becomes colder and it is necessary to urge the furnace fires, there is each year what may be termed a fall and winter crop of fires, arising solely from defective flues and chimneys. The Philadelphia *Ledger* of a recent date chronicles the loss of an expensive school house in that city, owing to a defective flue, and a few days later another was considerably damaged from the same cause. Not long since, a fine depot was set on fire and narrowly escaped destruction because the builder did not know, or had forgotten the fact, that fire will burn wood, even when in the shape of a depot floor, and had allowed the beams to come within 10 or 12 inches of a coal fire. It seems rather late in the history of civilization to announce as a fact that fire will burn wood, and all that is necessary to set the wood on fire is to heat it sufficiently. Yet the statement almost loses its sarcasm when we see how closely flues and stoves are placed to floors, beams and wooden partitions, and one feels moved to make the statement in good earnest as an unknown truth. When a brick flue passes near woodwork there is a double danger. First there is the constant corrosion of the mortar by the gases from the fire. Where wood is used as a fuel, the steam and pyroligneous acid, or creosote, have a very destructive influence upon the mortar, and if the flue is long, or special attention is given to economy by burning the fuel with the drafts nearly closed, the condensation of the acids and tarry matter will be very great, and the danger to the chimney great in proportion. It is quite difficult to find a modern chimney top where the mortar is not largely eaten away by this corrosive action, and it is not unusual, in making a careful inspection of a chimney, to find holes in many places inside a building. The second danger arises from the fact that when wood is exposed to a considerable degree of heat it undergoes certain chemical changes, parting with a portion of its water, and is then in a condition not unlike tinder. It takes fire at a much lower temperature than ordinary wood. According to the testimony of experts it would seem that when in such a state a match will give a suffiient heat and blaze to set a heavy beam on fire. It is therefore the height of folly to allow wood to come near enough to a flue to be heated by it. The heat chars the wood and prepares it to take fire at a spark, and the chimney is liable to be corroded into holes and thus furnish the necessary spark to kindle the fire. Wood in this condition, as might be supposed, burns with extreme rapidity, and is extinguished only with great difficulty.

Where metal flues are used for leading smoke to a chimney, the danger from heating the woodwork is greatly increased, on account of the greater radiation from them. They are readily corroded, and where holes make their appearance there is no certainty that some day there may not be an escape of fire. Usually there is an inward draft into the chimney, so that the danger seems to be small. But it not unfrequently happens when the dampers are closed or fresh fuel has been put on and carbonic oxide is escaping, that the opening of a furnace door causes an explosion of the gas which may extend some distance along the flue and be attended by a flash of flame from any of the larger openings. Several churches in Brooklyn have been destroyed by fire within the last ten years, under circumstances which make it not improbable that something of the sort may have taken place. A defective flue is as inexcusable as it would be to rest a stove-pipe upon an unprotected wooden beam.

A great many fires result from hot-air flues. Because the heat in them is never greater than that of melting tin, and because they are not in actual contact with wood, it is taken for granted that there can be no danger. Wood which has undergone the slow charring process that we have described, not only burns easily, but can be made to take fire without a greater heat than that due to melting tin, and we have heard of cases, which we consider perfectly well authenticated, where a heat of 212 degrees continued a series of years, has, without the presence of even a spark, set boards and beams on fire. The folly of those who put up hot air or steam pipes to run in contact with wood floors, beams or partitions, is little less than criminal.

When galvanized iron pipes are used, special care should be taken to see that corrosion does not take place very suddenly. If a stove or furnace pipe "sweats" or "drips" very much, frequent and careful inspection is needed to see that the pipe is not eaten into holes. When a faulty length is found, it should be removed at once. Next spring may be too late. In some parts of the country, notably in the eastern portion of Massachusetts, it is very difficult to prevent the rapid corrosion of stove pipe of all kinds; hence the greatest care should be taken in such localities to see that all pipes are in good condition not only when they are put up in the fall, but during the winter also they should be inspected to see that no thin places have given out.

Few persons will credit the degree of heat to which the air in large hot-air furnaces sometimes rises. It is quite commonly believed that 190 degrees is about the limit, and that from 100 to 150 degrees is the rule. We are not prepared to say that this is not generally the case, but we do know that there are thousands of furnaces all over the northern part of the country where the hot-air flues frequently attain a temperature of from 440° to 500° F. It is not at all difficult with most furnaces, especially if they are a little too small for their work, to bring the flues in the immediate neighborhood of the furnace up to the melting point of tin 440 degrees. The lessons to be learned are these: Wood will burn, and furnace flues are amply hot enough under some circumstances to ignite it; chimneys may work nicely, and yet have openings large enough to permit the escape of fire in case of gas explosions, and in any case it is best to be perfectly sure of the conditions of chimneys and flues not only in the fall, but all through the season during which they are to be used.

VERY WONDERFUL PLUMBING WORK.

The funny man of the *World* gives the following curious account of the roofing of St. Peter's at Rome, Italy:

An interesting contest has been begun at Rome, upon which all civilized mankind will bend an anxious and hopeful eye. The Pope has tackled the plumbers! In 1863 Pius IX gave orders that the cupola of St. Peter's should be recoated with lead, upon the distinct understanding that the work should be completed in four years. The surface of the dome was divided into 16 sections, to cover each of which, according to the London *Telegraph* "nearly a million pounds of lead" is required. The experienced reader can readily imagine that when some hundreds of plumbers had a job of this magnitude on hand, and when each plumber's boy, on being sent home for some indispensable article which the plumber had carefully remembered to forget on leaving the shop in the morning, had to descend and ascend flights of stairs and ladders aggregating 470 feet in height; and when each plumber had to traverse these 310 yards of stairs and ladders twice a day there were greater openings for procrastination than ever presented themselves even in the dreams of the most fanciful member of the craft that gave his imagination full swing in making up a bill. After 17 years had been employed on the job, there still remained three sections to cover, while some of the old work doubtless was already in a gratifying state of dilapidation. Leo XIII, however, had stirred up the plumbers with a long soldering iron, as it were and they have promised to have the work completed by the beginning of 1882, which, according to previous experience, means somewhat about 1891. The Popes have hitherto humbled monarchs and brought hostile nations to their knees, they have not hesitated to deal determinedly with plagues of locusts and menacing comets, but this is the first time to our knowledge that the supreme pontiff has tackled a plumber. As unhappily His Holiness has none but spiritual weapons at his hand, and the plumber in the words of Job, laugheth at the shaking of an excommunication, the experiment cannot be conducted with as much certainty of a triumphal solution as if these were the good old days of the gibbet and the stake.

THE WARNER OBSERVATORY AT ROCHESTER, N. Y.—The new telescope for this observatory will be twenty-two feet in length, and its lens sixteen inches in diameter. Besides having the third telescope in size heretofore manufactured, the dome of the observatory will have new appliances for specially observing certain portions of the heavens. With the ample endowment due to Mr. H. H. Warner, it is the intention to make this the finest private observatory in the world. In the past, Professor Swift has labored under many disadvantages, and met with many obstacles in finding the new comet. This observatory is to be specially devoted to discoveries, which, it is said, there is reason to look for in the near future.

THE largest casting ever made in the United States was turned out at the Black Diamond Steel Works, Pittsburgh. The casting was an anvil block for a 17 ton steam hammer, and its weight was 160 tons. Five furnaces were built expressly for melting the iron, and seven hours were occupied in running the metal. The hammer will be the largest in the country, the next largest, of 10 tons, being at Nashua, N. H. Four months will elapse before the block will be cool enough to handle.