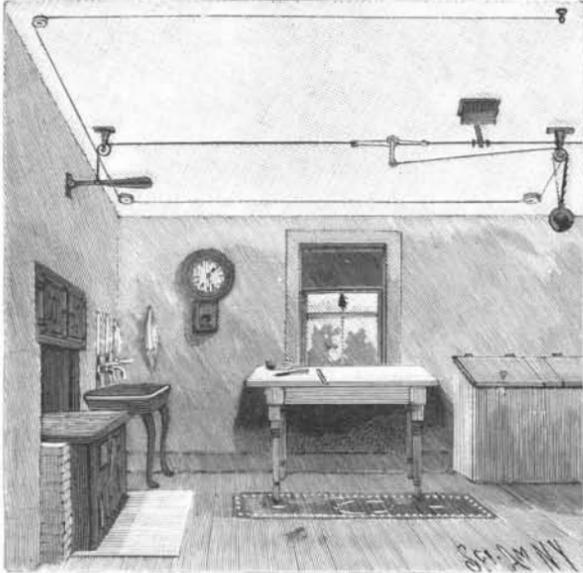


## AN INEXPENSIVE FIRE ALARM.

The illustration represents a fire alarm whose operation is not dependent upon electrical circuits, but which operates positively in case of fire to sound the alarm in all parts of the building with which the apparatus is connected. The improvement has been patented by Mr. Eugene P. McCaslin, of Tullahoma, Tenn. (address in care of Alan Parker, First National Bank). A combustible cord, preferably of silk, is run around the ceiling from a peg, passing over guide pulleys, a weight at the end of the cord holding it taut.

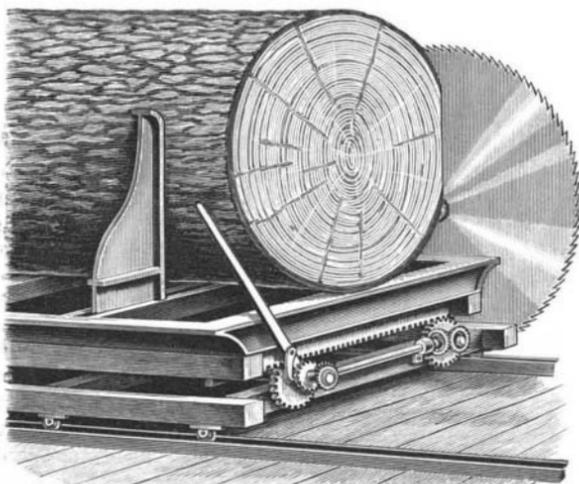


McCASLIN'S FIRE ALARM.

To the weight is also attached a noncombustible cord, whose other end is secured to a tripping lever, a pull upon which disconnects two sections of a taut wire, one section of which is connected to extend through openings into all the adjacent rooms and to all parts of the building, having connection with an alarm at all desired points. If the silk combustible cord is burned, the weight is dropped and the tripping lever operated to cause the separation of the taut wire sections, thus sounding the several alarms. The other section of the taut wire is connected at its other end to a swinging weight fulcrumed on the wall of the room. Any suitable spring alarm may be used with this improvement.

## AN IMPROVED SAWMILL CARRIAGE.

To facilitate the squaring of large logs by the use of only one saw of moderate size, instead of employing in the work an upper and a lower saw, the improved carriage shown in the illustration has been devised and patented by Mr. Mat Cox, of Hale's Point, Tenn. Combined with the main frame of the carriage is a supplemental frame carrying the log, the main frame having rollers running in guides on the floor or the ground, the tracks extending in a direction corresponding to that in which the saw moves. Mounted on this frame is a supplemental log-carrying frame, provided with the usual knees or head blocks and mechanism for working them, and the lower or bottom side of each end of the upper frame has a rack bar engaging teeth on eccentrics mounted on longitudinal shafts. These shafts carry miter wheels engaging similar wheels on a transverse shaft imparting motion from one eccentric to the other, upon the operation of a hand lever carrying pawls engaged by a ratchet wheel. By means of this lever, the supplemental frame carrying the log may be raised and carried forward toward the saw, or withdrawn to the lowered position shown in the larger view, one of the smaller figures being a sectional view representing the carriage in its highest position with a squared log



COX'S SAWMILL CARRIAGE.

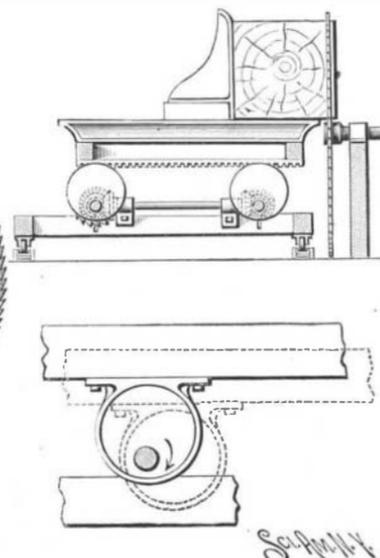
thereon. For its first position, therefore, the carriage may be lowered to bring the edge of the log where the saw enters to a point almost level with the axis of the saw, the supplemental frame being afterward raised to the position shown in the smaller view, to do work as has been ordinarily done heretofore. The other small figure shows a modified form of eccentric, doing away with the rack bar and toothed eccentrics, this construction being somewhat cheaper. A short outside shaft attached to the lower carriage, and carrying bevel gears engaging a larger bevel on the longitudinal shaft, affords increased power in raising the carriage and log, and a brake wheel on this shaft, encircled by a band of spring steel, facilitates gently lowering the upper carriage, or arresting it at any desired point. Rests may be provided for the outer edge of the upper carriage, when in its raised and forward position, and a graduated dial over which moves a pointer may be attached to the cross shaft to indicate the amount of forward movement of the upper carriage in being raised, thus regulating the thickness of the plank taken off.

## Great Wall of China.

Long ago Mongolia was not a part of the Chinese empire, as it is to-day, and the Hiungnu ancestors of the Mongolians were China's most terrible enemy. So this great wall was stretched along the border between China and Mongolia in order to keep out the formidable invaders from the north. It is probably the only instance in history where the precise boundary between two countries was for ages marked by a stone wall. The wall, or its ruins, may still be traced from the Gulf of Liaotung, at the northern extremity of the Yellow Sea, far over the plains and mountains, nearly to the western limit of China proper.

It was a colossal work and ranks with the Grand Canal of China and the Pyramids of Egypt as among the most stupendous of human achievements. It had a length of over 2,000 miles, counting various sinuosities and the double and triple walls built in a few places, notably to the north of the provinces of Pechili and Shansi. When we consider that this wall had an average height of about 30 feet and a mean width of about 22 feet, and that it is supposed to have contained about 160,000,000 cubic meters of solid masonry, we may gain some slight idea of the enormous labor involved in its construction. But it did not take a very great many years to build it. The Emperor Chi Hoangti was very sure he needed that wall when he began the great work twenty-one centuries ago. It cost as much in human life and treasure as a great war, and cost all the more because so much haste was made to erect it. Several hundred thousand men are believed to have perished while they were at work on the wall, which was to be at once a protection against their country's enemies and a memorial of their martyrdom.

A great many writers have spoken of this wall as a pure waste of human energy. This is a mistake. It is certain that the wall was worth, to ancient China, far more than it ever cost her. From a military point of view it proved to be of prime importance. There is no doubt that for some centuries the hordes of Mongolia were stopped in their war expeditions at the foot of this wall, which marked the southern edge of their land; for the wall was nothing more or less than an immense fortification, the greatest the world ever saw, and there were plenty of Chinese soldiers to man it. Scattered all along the top of the wall were sentinels within communicating distance of one another, and no enemy could approach without these sentinels signaling the fact all along the frontier. Every gate in the wall had its garrison and every mountain pass through which the wall was built had its military camp. Towns were built and agriculture developed along the wall in order to supply the needs of the soldiers, and this fact in itself was a protection to China, as it increased the density

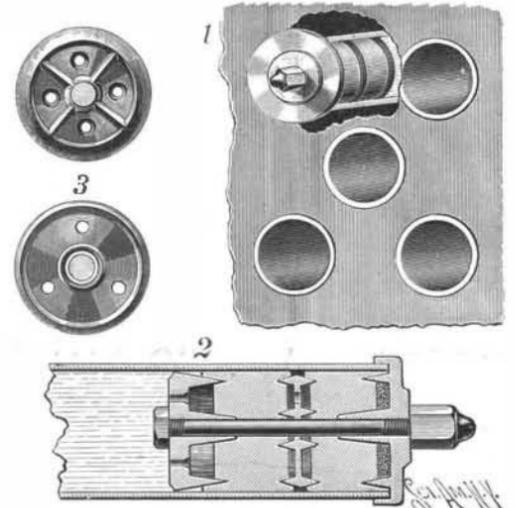


of population along the frontier. For fourteen centuries the wall helped to protect the empire from its northern foes. Then came the great conqueror of Asia, Genghis Khan, who forced the mighty rampart China had reared, and from that day the wall ceased forever to be of any strategic value. For long stretches the wall has now almost entirely disappeared. Millions of tons of material have been torn from it

to serve the purposes of the near-by inhabitants. The mere wear and tear of the ages alone would have toppled much of it in ruins. The time was when it was a crime punishable with death to so much as scratch it with a pin. Yet it is doubtful if to-day much of the original wall is left. What is now seen of it is the patchwork of the centuries during the time when the wall was China's great bulwark to the north.—N. Y. Sun.

## A PLUG FOR LEAKY TUBES IN BOILERS.

A plug of wood or similar expansible material, formed for engagement by metallic rims or heads, to press the plug rims into firm contact with the interior surface of a boiler tube, is represented in the illustration, and forms the subject of a patent issued to Mr. Andrew L. Harrison, of the United States revenue steamer Colfax, Wilmington, N. C. Fig. 1 illustrates the application of the improvement, Fig. 2 being a sectional view of the plug tightened in place in a tube, while Fig. 3 shows face views of the inner head. The plugs are of slightly less diameter than the tube, and are fitted centrally on a bolt having at its inner end a head and at the outer end a tightening head and nut, there being also another head between the plugs. Each of the plugs has an annular rim engaged by wedge-shaped rims on the heads, and the inner head also has a wedge-shaped hub engaging recesses in the bore of the inner plug, while the intermediate head has an annular wedge-shaped projection on both sides to engage corresponding recesses in both of the plugs. In the web of the inner and the intermediate hub are apertures to permit the water in the tube to pass to the wooden plugs, expanding the latter as the moisture passes into the pores of the wood. The outer head used in tightening and forcing the plugs toward each other is somewhat different from the permanent outer head shown in Fig. 2, the tightening head having con-



HARRISON'S TUBE PLUG.

siderable bearing surface abutting against the outer face of the outer plug, but after the plugs have been drawn partly tight in the tube the tightening head is removed and the permanent one substituted, with its inwardly extending flange and rim and wedge-shaped hub. Before the placing of the latter head cement is placed between the outer flange and rim of the head, the cement, on screwing up the nut, being pressed on to the edge of the tube and on the tube sheet, thus forming a cement joint.

## Popular Ideas of Inventors.

In a recent address Mr. Alexander Siemens said that it is a popular superstition that the inventors are heaven made, and that they can produce useful novelties to order in any branch of manufacture where a want exists, if only their attention is drawn to it. "The history of the invention of the steam engine," he added, "is a well known illustration of the point I wish to emphasize. According to the popular version, Watt, a small boy, saw the lid of a teakettle move up and down, when the water was boiling, and this suggested to him the construction of a steam engine. As a matter of fact, Watt made himself acquainted with what had been done before (a point altogether ignored in the popular version), and had to work very hard before he brought his invention to a successful issue. His example is typical of the true method of progress, and we may generally say that in order to approach a problem with the most certain prospect of success it is necessary:

- "1. To define, as accurately as possible, the want that exists, or the particular object that is to be attained.
  - "2. To be well acquainted with the scientific principles which come into play.
  - "3. To know how the want is met, or the object attained in practical life.
  - "4. To find out what proposals have been made by others in the same or in a similar case.
- "A careful attention to these requirements will prevent much disappointment and waste of energy, as will be obvious to all of you without further explanation."