

NOVEL TICKET REEL AND RECEPTACLE.

The engraving shows a machine for tallying, recording, or indicating the numbers of fares collected upon cars or other public passenger vehicles. It is of the class employing, in connection with a locked box or receptacle carried by the conductor or collector, duplicate, double, or sectional tickets, one portion or section of which is given to the passengers when the fare is collected, while the other section or duplicate is deposited in the box, so that as the conductor is compelled to deposit a ticket or check in the locked box as each fare is collected, a tally or record is made of the amount to be accounted for, and fraud and cheating is prevented.

Fig. 1 shows the apparatus as fitted and secured to the conductor's arm in a convenient position for its operation and for the deposit of the tickets or checks by the hand of the opposite arm; Fig. 2 is a vertical section; Fig. 3 is a horizontal section showing the roll of tickets, and Fig. 4 is a top view with the cover removed showing the alarm bell.

The casing, A, is of the shape shown, having a curved bottom, *a*, to fit the arm. Near the top of the casing is a transverse partition plate, A', which separates the casing into two compartments, the upper and smaller one, B, being for the reception of the alarm bell and its striking mechanism, while the lower compartment, B', is for the checks or sections of the tickets, which are to be deposited in the receptacle, one for each fare as collected. The curved bottom, *a*, of the ticket or check receptacle is hinged at one side of the body of the casing.

The alarm bell is fastened in the center of its compartment, B, to the partition plate, A', and is covered and protected from external blows by the cover of the casing, which fits upon the upper end of the cylindrical body. The striking mechanism consists of a hammer acted upon by a spring and tripped by a crank or handle outside of the case. Secured to or forming part of the shaft of the crank or handle inside a small compartment, there is a roller, C, which, in conjunction with another roller, C, constitutes feed rollers for the tickets. These tickets are formed in strips, or are in what is commonly known as "ribbon form," and wound into a compact roll, as shown in Fig. 3, the roll being then placed in the apparatus, just back of the feeding rolls, upon a removable partition plate, A, in the ticket compartment. Each ticket is joined to the contiguous one by a readily separable connection, the tickets being formed, for example, in a long strip, and separated partially by a series of transverse perforations. Each ticket is a double or two-part ticket readily separable.

The operation of the apparatus is as follows:

It having been fitted to one arm of the conductor and secured by a strap, and the tickets having been placed in the machine with the first one between the feed rolls, upon receiving a fare the conductor turns the crank to the extent of one revolution, which projects a ticket from the delivery spout and rings the bell. The ticket is then separated from the strip. The section or portion with the number upon it is then deposited by the conductor in the locked receptacle, and the other section handed to the passenger, to be retained as evidence of the payment of the fare. At the end of the trip the apparatus is handed to the proper person, who inspects the tickets that remain unfed from the apparatus, and also counts the checks deposited in the box. If the number of tickets fed from the machine does not correspond with the number of checks in the box the dereliction in duty of the conductor is made apparent, and dishonesty exposed; while if the checks and tickets disposed of correspond, the amount to be accounted for is ascertained. This invention was recently patented by Mr. C. S. Locke, of Chicago, Ill.

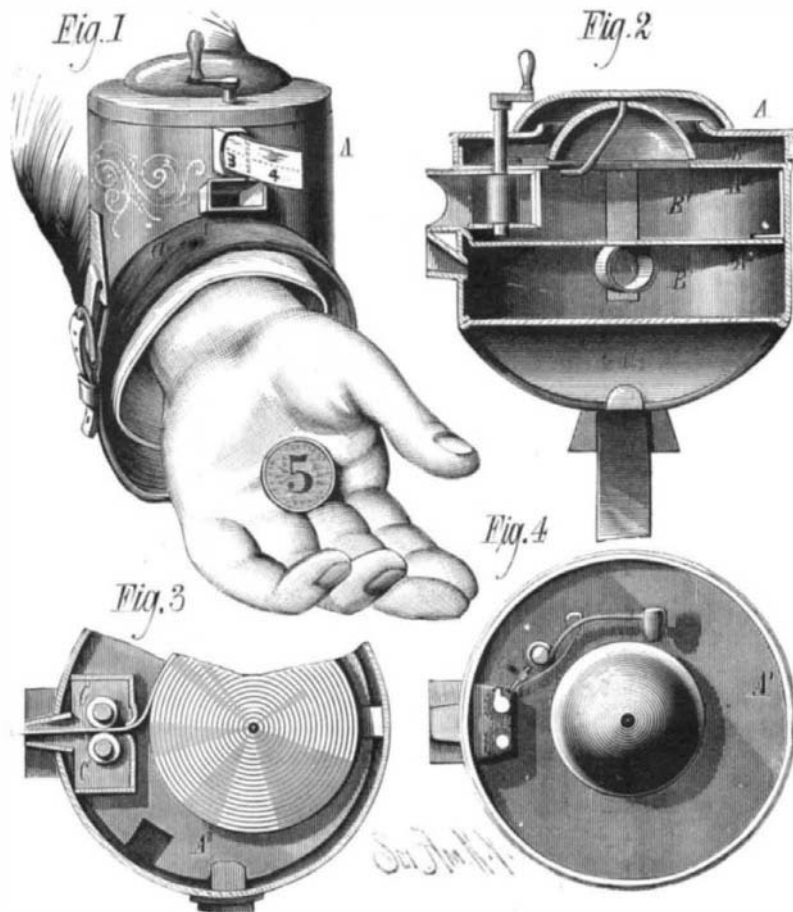
NOVEL GRATE-BAR.

We give an engraving of an improved device for improving combustion in a boiler furnace where it is most needed, that is, at or near the bridge wall.

It is very essential, in order to maintain uniform combustion in a furnace, to supply the fuel with a uniform and sufficient quantity of air well distributed beneath it; and in furnaces as ordinarily constructed, having parallel grate-bars extending from the front backward, the air is taken up very largely by the front section of the fire, and the back part of the fire, or the part more remote from the draught, suffers in consequence, and an unequal combustion of the fuel and a

consequent loss in the amount of heat developed therefrom result.

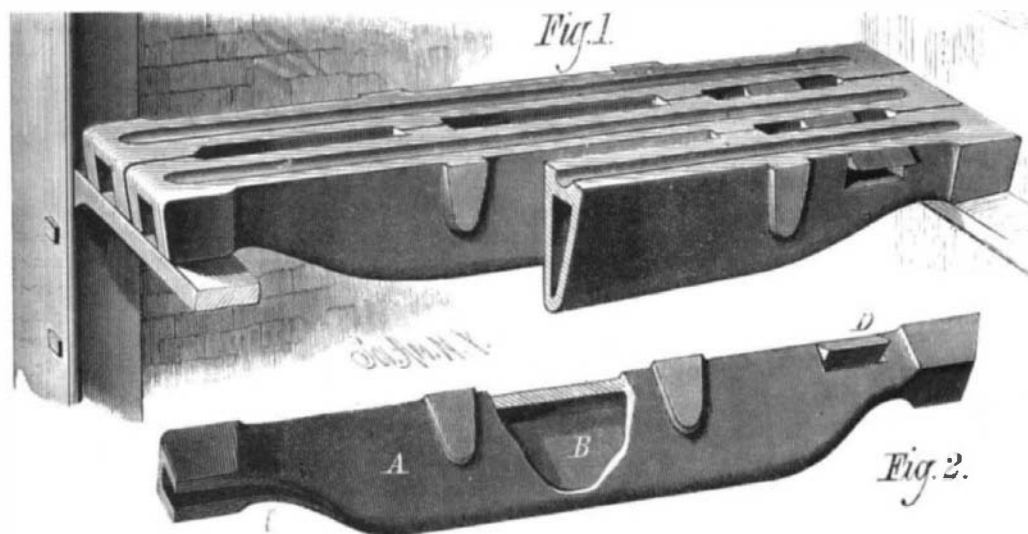
The engraving shows an invention, designed to provide the rear portion of the fuel with sufficient air to maintain a combustion equal to that of the front by introducing air thereto through a chamber or passage in each of the grate-bars; and in constructing this grate-bar to accomplish this purpose, the inventor has secured a lighter and stronger bar from the same amount of metal, and has provided means for keeping the bar cool enough to prevent its wearing, twisting, or warping under the influence of the heat.

**LOCKE'S TICKET REEL AND RECEPTACLE.**

It is well known among engineers that there is little real combustion at the rear end of the furnace, and that large amounts of unconsumed inflammable gases pass off without yielding their heat.

The Fairbairn grate-bar is proposed as a remedy for this defective combustion. It requires no changes of setting of boilers; no auxiliary draught; it needs no expensive alterations; it merely substitutes for the common grate-bar one that will allow the air to reach the entire surface of the fire-box; it carries the air to the furthest part of the furnace.

The bar, A, is cored in the casting so as to be hollow.

**THE FAIRBAIRN GRATE-BAR.**

with lateral or side apertures, D, at the rear end, or nearly so. As in ordinary grate-bars, the air passes up between the bars; as in ordinary grate-bars, the space occupied is the same; as in ordinary grate-bars, one, when defective, can be removed and another readily substituted.

Unlike other grate-bars, this one allows the air from the draught-hole in front of the furnace, and from the ash-pit, to traverse the length of the hollow bar, being heated in its passage, and emerging at or near the end of the bar, or the rear end of the furnace, giving out from the lateral openings a current of heated air that instantly inflames the escaping gases that might otherwise pass up the chimney without doing service, or performing work. It may be said that this hollow bar is a continuation of the draught-door, and gives as much a chance for perfect combustion to the coal at the

rear end of the furnace as that at the front of the furnace. For further information address the Fairbairn Manufacturing Company, 272 Purchase street, Boston, Mass.

The East River Bridge.

When the contract was made for the steel work of the East River Bridge the amount named was 5,000 tons, which by mutual consent was agreed to cover 5,500 tons. This has been taken as the maximum weight of this portion of the superstructure. Naturally, therefore, there was not a little surprise when it was announced recently by the engineers that 1,200 tons more would be required, increasing the weight of steel in the superstructure to 6,700 tons. The principal reason given for this increase of weight is the need of strengthening the bridge to enable it to carry heavier loads than were contemplated at first. According to a statement by Assistant Engineer Martin, who has had charge of the practical work of construction from the first, the growth of the cities to be connected and the preparation of the elevated roads to carry freight trains have made it probable that direct railway connection will be made between the Long Island roads and the roads entering New York from the East, the North, and the West. At any rate, in anticipation of such traffic, the bridge plans have been modified to enable regular passenger and freight cars to run over the bridge, and the weight had to be correspondingly increased. As reported by the *Evening Post*, Mr. Martin said, in pointing out the chief instances in which increased weight had been made necessary to get increased strength:

The bridge will consist on each side of four massive steel beams, one on top of the other, into which are bolted the transverse beams upon which are laid the floor girders of the bridge itself. When it was decided to increase the strength of the bridge the method adopted was to run what are called "overflow-stays"—wire cables which run down from the top of each tower at an angle of about 45°, and are fastened to the longitudinal steel beams which form the sides of the bridge. It follows that, when weight is put upon the bridge at the point where the overflow stays are fastened to the bridge, the strain falls upon the stays instead of the main cables and tends to press the bridge against the tower. In order that the bridge may resist this "back

pressure" the steel girders between the tower and the point where the overflow stays reach the bridge have had to be stiffened and increased in size. This is the chief item of increase, and will reduce the weight upon the cables by about one-fifth. In the next place the Pullman cars are nearly three feet higher than the cars originally intended for bridge traffic, and that fact necessitated increasing the height of the 2,800 upright posts which divide off the steam tracks from the passenger and carriage roads. Thirdly, it may be assumed that all the castings used in the bridge are between two and three per cent heavier than the contract calls for,

because the contractor prefers that to running the risk of having them rejected, as they are of no value except for bridge purposes. "There are other considerations," said Mr. Martin, "which have caused the engineers to alter different parts of the steel work in the bridge, but they would not be understood without long and technical explanations. I repeat that the 1,200 tons extra weight of steel have materially increased the strength of the bridge instead of weakening it, as the public seems to suppose."

Point Barrow Signal Station.

The chief signal officer has received from Lieutenant Ray, in command of the Arctic meteorological station at Point Barrow, a report of the successful planting of the station near the native

village Ooglaamie, Alaska. The station is on the only high ground at Point Barrow, about eight miles from the extreme northern end of the Point, and on the northeast side of a small inlet which he has named Golden Fleece. The voyage was a long and very trying one, a heavy gale having been encountered off Cape Lisburne, driving the expedition out of its course to the north and west.

The landing was made September 8. The ground was covered with snow, and ice was forming rapidly at the date of the report, Sept. 15. Not having seen the sun since his arrival Lieutenant Ray had to depend on dead reckoning from his log-book in determining the position of the new station. He makes it latitude 71° 17' 50" north; longitude 156° 28' 45" west.

Woven Electrical Wires.

A novel method of covering wire used for many electrical purposes has been devised by Professor A. E. Ayrton. The process is merely a modified form of weaving. The wire, which may be German silver, platinum, silver, etc., or simply copper or iron, if great cheapness of construction be desired, is wound bare on the shuttle and used as the weft, being woven backward and forward between parallel fibers of silk, cotton, or any suitable material employed as the warp. Or the wires may be arranged as the warp and the insulating material employed on the shuttle. The web, whether composed of a warp of wires and a weft of insulating material, or a warp of threads of insulating material and a weft of wire, may, if desired, be steeped in or passed through a bath of bitumen or melted paraffine wax or of other similar liquid, and an extra security of insulation and solidity is thus secured. It may be rolled or twisted up sideways to be placed in the bath. The web or ribbon, in the flat state as woven, can be easily painted with any fluid compound if desired, an ordinary paint brush being employed for the purpose, or the web or ribbon may be covered with gutta percha, or with some similar substance, by being passed through a die where the compound is under pressure.

Safety Car-Couplings.

Inventors and owners of car-coupling apparatus will be interested by the announcement of the State Railway Commissioners of Connecticut that they will give a public hearing upon the subject of safety couplings in the State Capitol, in Hartford, Nov. 29.

A bill is before the General Assembly of the State, the design of which is to compel all railway companies operating within the State to provide their cars with automatic coupling apparatus.

A Remarkable Arctic Voyage.

From a statement published in *Lloyd's List*, it appears that, during the past summer, Captain Adams, of the steam whaler *Arctic*, in his search for whales, not only succeeded in reaching Melville Bay, the usual limits of a whaling voyage to Baffin's Bay, but passed through Lancaster Sound, entered Wellington Channel as far as the water has been penetrated by any expedition, turned back and steamed up Barrow Strait, then took a course down Peel Sound, and reached within a few miles of the spot where the *Erebus* and *Terror* were lost. Retracing his path he visited Beechy Island, thence steamed down Prince Regent Inlet, and got as far south as Cape Nordenskjold on the west side and within fifteen miles of Fury and Hecla Strait on the east side of the Gulf of Boothia. It was only in this gulf that he met with success in getting whales, and that was not much.

Presuming that the course is described without exaggeration, though no mention is made of Queen's Channel or Franklin Strait, it is undoubtedly the most extraordinary voyage that has ever been performed in the polar regions, *via* Davis Strait, in one season. Having the advantage of the experience of his predecessors, knowing where to go, and the probable difficulties from the ice, yet to have accomplished so much in one season proves him one of the most daring and skillful of Arctic navigators. It is in a sense no small triumph for engineering, for without the power of steam no ship could have done so much in so short a time. Capt. Adams

has given previous proofs of his enterprise. It was with him that Captain Markham, R.N., made his "Whaling Voyage in the Arctic Regions," during which the *Arctic* rescued a portion of the ill-fated *Polaris* Expedition.—*Engineering*.

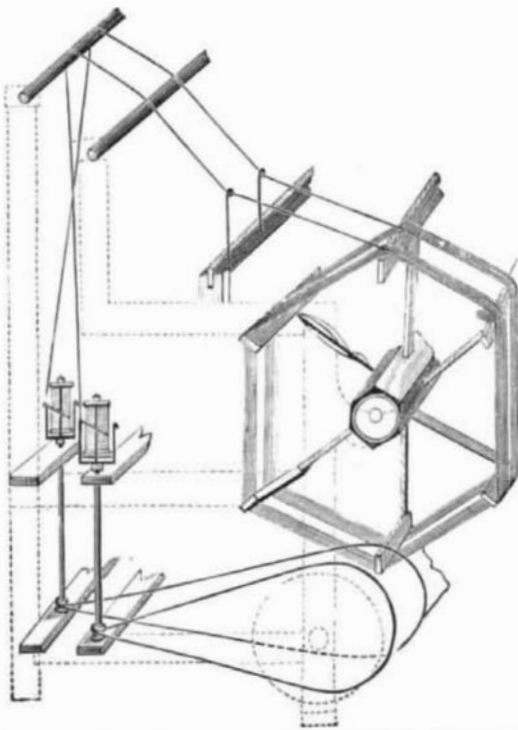
THE BIRTH RATE IN FRANCE.—The *Continental Gazette* notes that the birth rate in France is steadily diminishing; so is that of marriage, but in a lesser degree, the number of children resulting from these marriages having declined.

IMPROVED TWISTING REEL.

This machine, of which we present a perspective view in Fig. 1 and a section in Fig. 2, has been invented to simplify the process of twisting and reeling, which it successfully accomplishes by combining both operations in one machine. It is simple in its arrangement, and calls for little description on our part, nearly all the details being fully shown in the drawings.

Mr. Thomas Unsworth, London, is the maker. Our en-

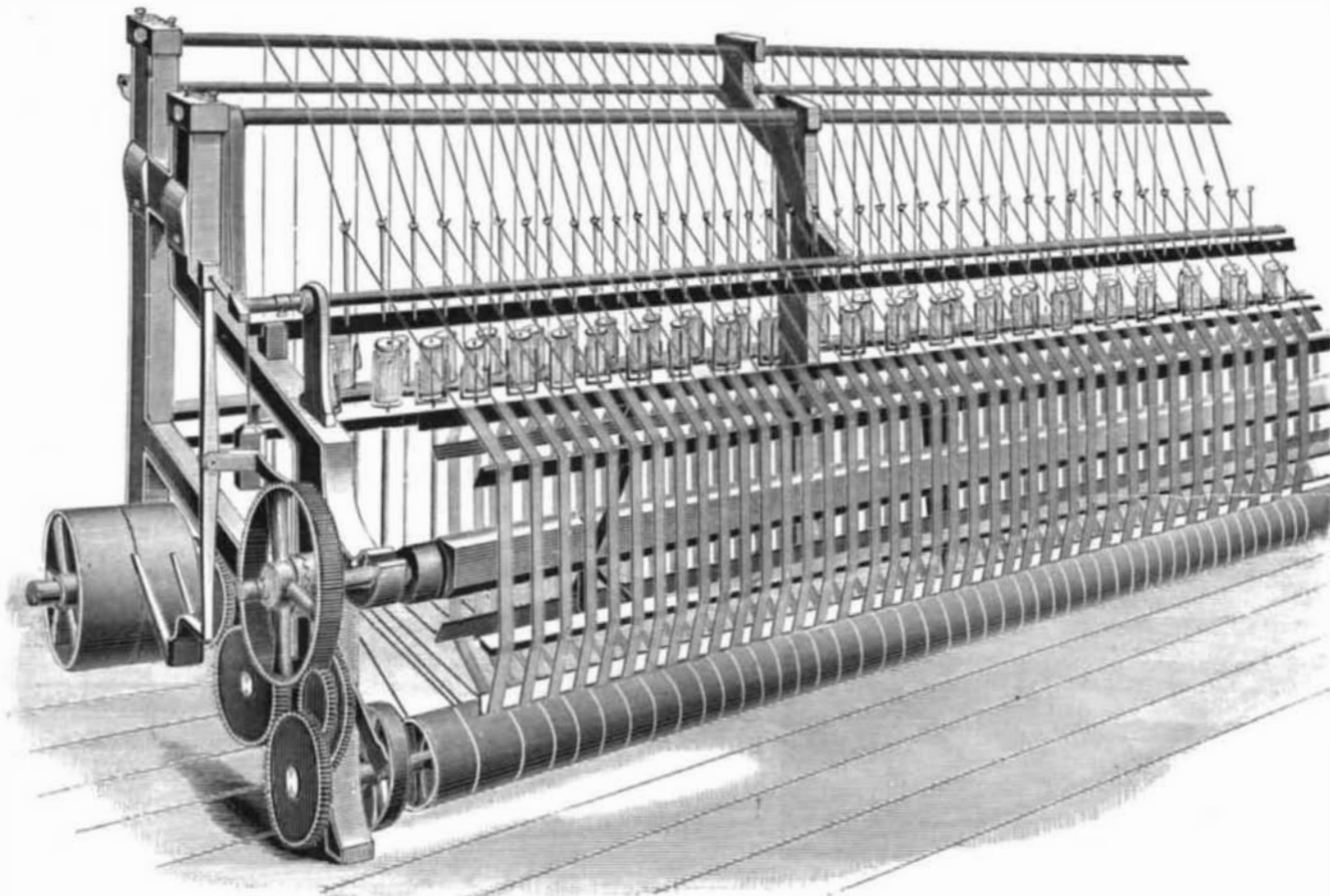
Fig. 2.



gravings are from the *Textile Manufacturer*. The bobbins, instead of being mounted in a creel as usual, are placed upon the revolving spindles, and within the arms of inverted fliers, with which they are mounted. The doubled threads are then carried vertically upward and over the carrier rails, which bring them to the front of the machine.

Here, descending, they pass through guide wires, and are then attached to the reel. This reel is arranged so as to make several steps or movements in a lateral direction, by which means the hank can be subdivided into less or any other required length with perfect ease.

Doffing is facilitated by the reel being made to col-



UNSWORTH'S IMPROVED TWISTING REEL.

lapse, and the attachment of an ingenious arrangement at the end of its axle, by which the doffing can be passed off with a minimum risk of staining the yarn with oil. The speed of the spindles and the reel is capable of being regulated in relation to each other, by means of a change wheel, one of the train shown in the illustration, so that more or less twist can be put in as may be desired. As will be gathered from the above, it is exceedingly simple, but though this is the case, it is said that it effects important economies.

MECHANICAL INVENTIONS.

An improved carpenter's square, which will be found very useful to builders and others, has been patented by Mr. Jeremiah C. K. Howard, of Edgerton, Montana Territory. The invention consists of a carpenter's square containing a table for determining the length of rafters for pitches and spans of roofs, and a rule finding the length of rafters for spans of one-fourth, one-third, or one-half pitch. The square has columns of figures on it, divided by inch graduations, and representing the various pitches and spans of roof, arranged in such relation to each other as to indicate the length of rafters corresponding to each combination.

An automatic sampler for flour and other substances, the object of which is to facilitate the taking of samples at regular intervals of time, has been patented by Messrs. James S. Hillyer and George H. Hillyer, of Faribault, Minn. The invention consists in an automatic sampler, composed of a stationary cylinder having an upper receiving aperture in its side, a rotating interior cylinder provided with pockets, which are brought, one at a time, at regular intervals under the receiving aperture in the exterior cylinder, for reception of the flour or other samples, a spring driving and stop mechanism applied to the interior cylinder, and a stop bar, controlled by the hand of a clockwork, for liberating the interior cylinder to move the distance of a pocket at stated periods. By this device a mill superintendent will be furnished with samples on his return after an absence of work done, and in case of the stoppage of the mill, that fact will be made known to him, also the time when and for about how long the stoppage continued, so that he can fix the responsibility where due.

An improved treadle for sewing machines, lathes, and other purposes, capable of being more conveniently worked and with less strain on the operator than ordinary treadles, has been patented by Mr. Jonas Michael Hultqvist, of Stockholm, Sweden. This treadle has its footboard raised a short distance above its shaft, which latter is situated about one-third the length of the footboard from its heel end. It may be connected with its shaft by brackets, and is provided in front with an arm, projecting downward and outward, to which the rod for driving the crank is attached. By this construction of treadle the front of the foot is not required to be bent downward, thereby avoiding cramps, and, by depressing the heel part a very short distance only, a considerable stroke is obtained.

Mr. Horace L. Kingsley, of Racine, Wis., has patented an improved oscillating gear for platform spring wagons, the object of which is to prevent that twisting and straining of the gear and springs which usually results when the gear is rigid. In this improved gear, the center bar and the bar which rests thereon are hinged together by hooks or clips, and have

a convex and concave bearing one upon the other. This effectually provides for the rocking of the upper one of said bars upon the lower one, thereby keeping the wagon bed level. The center bar, which is hung on the king-bolt, has a plate for the latter formed on it. A short bar permanently secured to crossbars, which are riveted or bolted to the bar that rests on the center piece, assists in forming a support for the wagon bed.

An improved releasing attachment for mechanical alarms, for use as a protection against burglars and in case of fire, etc., has been patented by Mr. Harvey A. Holloman, of White Rock, Texas. The invention consists in a wire attached to the anchor or escapement lever of a clockwork for ringing or sounding an alarm bell. This wire has a hook at

its outer end, which is passed into a loop, ring, or hook at the end of a wire connected with the key-bolt or knob bolt of a lock, or with a wire leading to places a considerable distance from the alarm. The invention, which is very ingenious, admits of numerous modifications to adapt the alarm to different applications or places in which it may be used.

Messrs. Alfred Gurney and Robert H. Piper, of Newburyport, Mass., have patented an improved leather chamfering machine. The object of the invention is to facilitate the