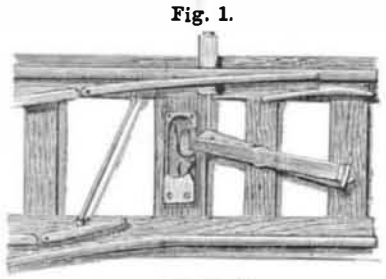
RECENT INVENTIONS.

Railroad Switch.

This invention consists of a switch lever contrivance and apparatus attached to the locomotive for enabling the switch to be shifted by the locomotive or not, at the will of the engineer, the shifting apparatus being contrived to be set by steam for shifting the switch to right or left. The switch is self-locking, and is so arranged that when open the switch rails can be shifted by the wheels, so as to pass it in one direction, after which the rails will be shifted back by a spring arrangement in the switch bar, so contrived for enabling the train coming upon the main line and wanting to back off over the switch to change the switch before passing it, so that after passing the switch it will be set for backing off on the branch. The engineer has by this contrivance full command of the switch, whichever way his train may be moving and whichever way the switch may be, whether open or closed, and, at the same time, the switch can be shifted by hand, if required. Fig. 1 is a plan view of the switch. Fig. 2 shows the steam switch operating mechanism. This ingenious device has been patented by Mr. Albert T. Fay, 715 Fourth St., S. E., Minneapolis, Minn.

Fig. 1.



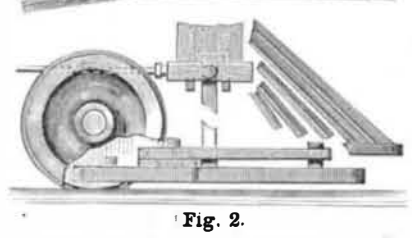
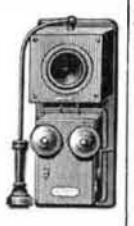


Fig. 2.

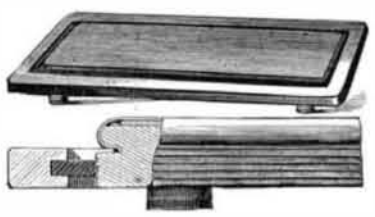
New Telephone.

The cut below shows one of the Bennett Telephone Company's instruments complete. For a private line telephone they are excellent, using no battery. A magneto bell generates all the electricity necessary for signaling. This company sells the instruments outright instead of renting them. Business men will find them very convenient in connecting the various departments of a store, factory, or outbuildings. Three to seven instruments may be connected in a line, or by means of their key board any one instrument may be rung. Right angles may be put in the line without the least detrimental effect. The instrument has a patent earphone attachment, and, as we are informed, the telephone is covered by six United States patents. The general office and factory is at Indianapolis, Ind.



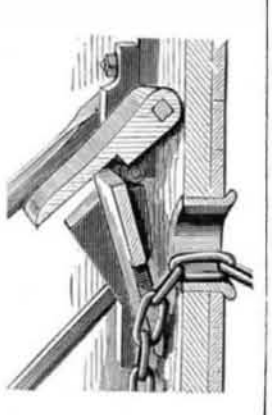
Bosom Stretcher and Ironing Board.

The engraving shows a very simple and practical device for stretching the bosoms of shirts and holding them taut while being ironed. The invention consists in an ironing board combined with a frame having rubber strips projecting from its inner edges; this frame is passed over the board to hold the shirt. The ironing board is provided on its sides and ends with corrugations to prevent the edges of the rubber strips of the frame from slipping. By means of this device it is claimed a child can iron a shirt bosom as well as the most experienced person. There is nothing about this stretcher to tear or injure a shirt. It gives the bosom the proper shape, and is very easily used. This useful invention has been patented by Mr. A. C. Gibson, 377 Fifth Avenue, Chicago, Ill.



Cable Stopper.

The engraving shows an improved cable stopper recently patented by Mr. John B Lynch, of Leadville, Colo. A frame having an opening at the center is closed by a door secured upon a shaft at one end of the frame. The upper part of the door is formed of a piece secured to the shaft, and hinged to the lower piece, the latter having its free end provided with a slot through which the chain passes. The slot is made narrow at its inner end, with parallel sides, and broadly flaring at its outer end, with its edges beveled on the upper side. The frame is provided with vertical guides on each side of the doorpiece, by which the movement of the lower part is confined to a direct line and great strength is given to the piece. The shaft is provided with suitable bearings at one end of the frame, and is connected to a lever by which power may be applied to operate the door. The frame is to be bolted to the bow of a vessel, and is further strengthened by stay rods which are to extend to the deck. When the door is shut down it engages the chain, and when it is opened by means of the lever it releases the chain.



Hood for Vehicle Tops.

This is a hood to be attached to the front of the tops of vehicles for preventing rain or snow from driving over the top of the apron. The hood is formed of a frame, which is covered with oil cloth or leather, as may be desired. The frame is formed of two bows which are pivoted to each other at or near the ends, and are of such size that one bow can fold within the other bow, as shown. Both bows are provided at the middle with a suitable joint to permit of folding the bows. Bracing straps are attached to both bows to prevent the outer bow from swinging down too far, and to relieve the covering from the strain. If the cover is made of very strong material, the brace bands can of course be dispensed with. A clamp hook is attached to each end of the larger bow and provided with a binding screw for securing it to the fixed front bow of a carriage top. When the hood is not to be used, the clamping screws are loosened, the hood is removed, the bows are folded, as shown in Fig. 2, and then can be conveniently stored in or under the seat. This invention has been patented by Mr. Charles T. Shreve, of Haddenfield, N. J.

The Force of Nitro-glycerine.

Mr. G. M. Roberts, manager of the Nobel's Explosives Company, London, writes as follows to the London *Times:*

Nitro-glycerine and dynamite do not, when exploded, exert such a force as is popularly believed. To speak precisely, the power developed by the explosion of a ton of dynamite is equal to 45,675 tons raised one foot, or 45,675 foot tons. One ton of nitro-glycerine similarly exploded will exert a power of 64,452 foot tons, and one ton of blasting gelatine, similarly exploded, 71,050 foot tons. These figures, although large, are not enormous, and need not excite terror. Seventy-one thousand tons of ordinary building stone, if arranged in the form of a cube, would measure only 90 feet on the side, and if it were possible to concentrate the whole force of a ton of blasting gelatine at the moment of explosion on such a mass, the only effect would be to lift it to the height of a foot. The foregoing figures are derived from experiments made at Ardeer with an instrument which gives accurate results in measuring the force of explosives. The power exerted by an explosion on surrounding objects is in the inverse ratio of the cube of the distance from the point of explosion. Thus, at 100 feet from the exact point of an explosion the power is only the cube of $\frac{1}{100}$ or $\frac{1}{1000}$ part of what it is at a distance of only one foot from that point; or, in other words, if the power at one foot from the spot be represented by 1,000,000, at the distance of 100 feet it will be but 1. It is thus seen that the effects are intensely local, but comparatively trifling at even short distances.

If a ton of dynamite or nitro-glycerine were exploded in a London street, the effects would be felt severely in the immediate neighborhood only of the explosion, and beyond that they would be confined to the mere breakage of windows. Indeed, it would be impossible by a single explosion, however large, to do damage to any considerable extent beyond the immediate neighborhood in which the explosion took place. On one occasion I happened to witness the explosion of over a ton of nitro-glycerine from a distance of only 60 yards. The nitro-glycerine was about 10 feet beneath the level of the ground, which was of sand and covered with water. Beyond the breakage of windows and the bursting of a few doors in the surrounding buildings there was no damage done. A little sand was thrown over me, but I received no personal injury.

Vague statements have been from time to time promulgated to induce the belief that there are stronger explosives than nitro-glycerine and nitro-glycerine preparations, and that the wretched men who have been guilty of the late attempts on public buildings, etc., are in possession of more powerful explosives than any known to chemists. The public may rest assured that such is not the case. Nitro-glycerine and its preparations form the strongest explosives yet known. The strongest of these is the material known as blasting gelatine. It consists of nitro-glycerine combined with a certain proportion of nitrated cotton. It is much more difficult to prepare than either nitro-glycerine or dynamite, and cannot be made by unskilled persons. If the power of dynamite be represented by 1,000, that of nitro glycerine will be 1,411, and of blasting gelatine, 1,555.

The 1½ cwt. of nitro-glycerine seized by the police the other day would, if exploded, exert a force of only 4,833 foot tons, and if converted into dynamite it would represent a force of only 4,567 foot tons. The conversion of nitro-glycerine into dynamite reduces the power of the former, but renders it more easy and safe to handle and use. The power given above is comparatively insignificant, and as it is the *maximum* effect that could be produced under the most favorable circumstances on the very spot of explosion, it never could be obtained in practice. It is therefore absurd to say, as was said the other day in a London paper, that the explosion of such a quantity of nitro-glycerine would blow up the whole of London. In fact, the explosion could scarcely be heard over London, and the damage done by it would be strictly local.

I have often, by way of experiment, exploded a pound of dynamite suspended from the end of a fishing rod by a string about 6 feet long, holding the rod in my hand the while. As there was no solid matter to project I received no injury, and the end of the fishing rod was not even scratched. About 3 feet of the string at the end of the rod was always left uninjured.

It will be seen from the foregoing that the scoundrels who attempt to destroy public buildings are powerless to do much harm by their operations. They cannot by any means at their disposal lay a whole city in ruins—not even a street. They may injure special buildings, but that is the most they can do.

Gelatine Plates Treated with Eosine.

At the last meeting of the Photographic Society of France were presented, in the names of MM. Clayton and Tailfer, two photographs of the same piece of material striped with deep blue, light yellow, orange, and violet. The ordinary photographic impression of such a stuff would give the effect of the blue being paler than the light yellow, and violet lighter than the orange. One of these two prints, from an ordinary gelatino-bromide plate, gives this effect. The other photograph, from a specially prepared plate, gives the true relative luminosity of the colors; that is to say, the yellow, a hue more luminous and lighter in tone to the eye than deep blue, is rendered by a tone conforming to this effect. It is the same with the orange and deep violet. The reagent employed by MM. Clayton and Tailfer to modify the nature of the sensitive film is eosine, a substance already indicated with this intent in 1876, in the *Photographic News*, by Major Waterhouse. M. Sarrault has actually used it on collodion plates; but the inventors named above, in applying it to gelatine plates, have had recourse to ammonia as a solvent for the eosine. To the emulsion one per cent of this solution is added, and afterward proceed in the usual way. With plates already coated, the solution must be mixed with alcohol, and the liquid spread over the surface of the plate and afterward washed in water. It is to be hoped that the plates will come into general use, as the important result obtained gives a truer reproduction of the relative luminosity of various colors. The error will thus be avoided, in our present sensitive films, of treating light yellow, red, and green as if of darker tone than in reality. The reproduction of pictures will gain much by this, and polychromatic applications of photography will be also considerably improved.

Floors Weakened by Gas Pipes.

A short article in the *Building and Engineering Times*, on the subject of weakened floors, deals very intelligently with the harm that may be done in this direction by careless gas fitters. It is common enough, in cases where a pipe has to be led under flooring and across joists to serve a pendant, for the pipe to be taken straight across the center of the room, and the joists notched about an inch deep all the way. Workmen who do this never reflect on the harm they are doing to the floor, nor do they know that a notch cut out of the top of a joist will seriously weaken it. This at once becomes evident when it is known that the strength of a joist, which is a rectangular beam, is proportional to the depth squared. If, therefore, a groove 1 inch deep is cut across a 7 inch deal, the reduction of strength is not only one-seventh, but a great deal more, in the proportion of 36 to 49, or a loss of rather more than one-quarter of the original strength of the beam. This somewhat startling result is due to the self-evident fact that the upper part of the joist is required to be solid, in order to resist compression, just as much as the lower portion must be capable of bearing tension; and to cut a notch in the top of it is equivalent to removing the substance along the whole length of the joist to the full depth of the groove. This observation only applies to cases where the notch is cut out of the center of the span, which is the commoner practice. There is much less objection to cutting joists close to the end, and thus allowing the pipe to be laid round the room to a point where it can be run to the center between two joists. Or, if this course cannot be followed, the pipe may be safely passed through a hole bored in the middle of the joists. If this is not feasible, the indispensable notch may be cut right down to the middle of the joist, and the pipe thus laid across the neutral line; the space above being afterward filled with a tight wedge which will safely transmit the compressive stress.

Suez Canal Tolls.

One of our English contemporaries, alluding to the fact that the present Suez Canal brings in dues to the amount of about £10,000 per day, thinks there is not much doubt but that a second canal would pay well, and that shipowners would only be too glad to have two passages through the Isthmus; for to say nothing of the gain of time owing to their being less traffic through each, the two canals would compete with each other, and the mutual reaction would, as in the case of two railways to the same place, make the rates go down. No nation has a tithe of the interest England has in the undertaking, and he hopes our commercial magnates will not so long delay in obtaining the necessary concession as to enable some other nation to step in and bear it off before them.