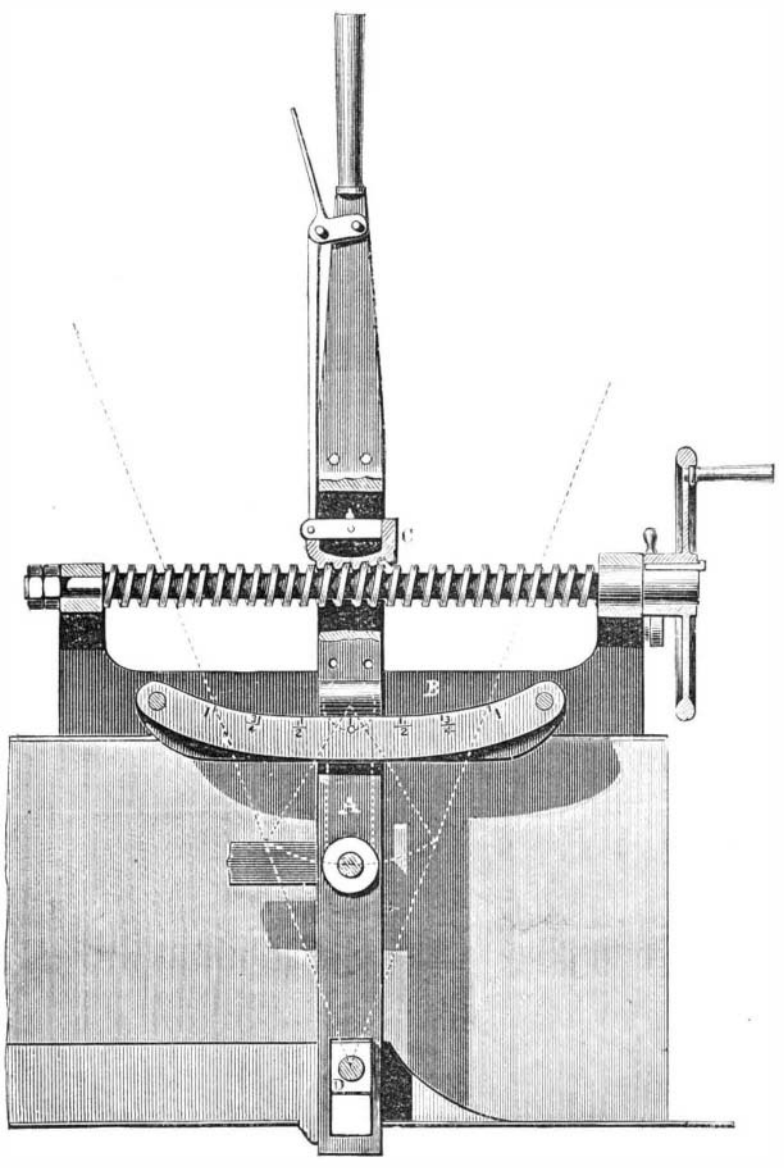
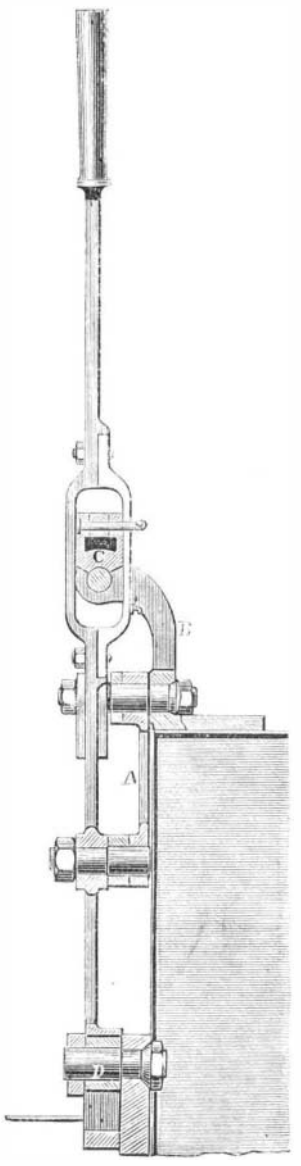
SCREW REVERSING GEAR FOR LOCOMOTIVES.

The value of screw-reversing gear for locomotives is daily more appreciated. In goods and shunting engines especially it saves a driver a great deal of labor. But the great difficulty hitherto encountered in its use lies in the fact that in cases of emergency it is impossible to reverse with promptitude.

In the annexed engraving we show an arrangement, invented and patented by Mr. A. Alexander, of the Worcester Engine Works Company, England, and fitted with success to a large number of locomotives built by the company for the Nicholas Railway, Russia.

This reversing lever differs from others hitherto introduced for working both by hand and screw, in having a straight cylindrical screw of the ordinary form, rigidly fixed in bearings at each end. The screw, when the lever is moved by hand, acts in place of the common notched quadrant.





SCREW REVERSING GEAR FOR LOCOMOTIVES.

The motion of the detent in the lever is kept parallel to the axis of the screw by the application of a radius link, A. An end of this link is fastened to the frame, B, which carries a straight double-thread screw, and the other end is attached to the lever. By means of this parallel motion the teeth of the detent, C, when drawn up, move when the lever is worked backward and forward nearly in a straight line parallel with the axis of the screw.

Owing to the form of the detent, C, about three teeth are always in gear with the screw in every position. In the engine frame is a stud carrying a block, D, and on this the lower end of the reversing lever, which has an oblong slot, moves up and down as the lever is moved, either by hand or screw.

It should be observed that the first design of lever on this system had an ordinary single detent falling between the threads of the screw. The present form of detent block keeping several teeth in gear was suggested by Mr. Thow, of the Worcester Engine Works. It is a decided improvement.—*The Engineer.*

Guns and Gun-Making.

The annual produce, writes a cotemporary, on the authority of a competent correspondent, of arms and ammunition in France exceeds in value 15,000,000 francs, or $3,000,000. Of this amount two thirds are represented by guns and bayonets, and the residue by side arms, caps, and cartridges. The trade employs in the aggregate 15,000 work people. Its principal seat—the Birmingham of France—is St. Etienne. The raw material employed, both iron and steel, is produced in France. Iron costs thirty-three francs per cwt., and steel varies in value from forty-seven francs to eighty francs per cwt. The use of steel in the manufacture of rifle barrels is proportionately greater than in England, the total quantity used being 2,500 tuns per annum. The wood of which the stocks are made is grown in France. Since the year 1855 the gun trade of France has been characterized by a very extended employment of the best machinery. It is admitted by Birmingham gunsmiths that the barrels used by French producers of small arms are as good as they can possibly be. The locks are not so good. They "speak" well, but pull unequally, and come up at last with a jerk. Compared with the sweet oily action of our best English "Brazier" locks, the French productions are positively inferior. On the average, the guns produced in France are much higher in price than those of Birmingham manufacture.

It is mentioned that a noticeable feature in the chassepot, as in the Prussian needle gun, is the absence of a lock, the discharge being effected by a sliding bolt in the back part of the breech action, which is shot forth by a spiral spring. This spring is said to be the weak point of the chassepot. If, however, it has a tendency to become weaker after much using, as is supposed to be the case, it could still be easily replaced. A stronger objection seems to lie in the great force required to push the bolt back into full cock. This had to be done by the direct pressure of the hand or thumb of the soldier upon the whole force of power of the spring. In pulling up an ordinary lock a powerful leverage is obtained in the hammer, which makes the action easy and pleasant. This, on the contrary, is heavy and fatiguing, and must tell in the course of a day's work.

The Belgian gunsmiths, especially in what are termed *armes de luxe*, are woefully behind the French, although to the latter they are indebted for most of their designs; the barrels are the best features of Belgian guns, being well made, clean, and of almost infinite variety in their twistings. A minute observer remarks: "The Damascus patterns in Belgium are even more varied and intricate than in France, and they are produced at astonishingly low prices for what they are or seem to be, for tales are rife about the Belgians veneering their barrels with Damascus iron." The locks are quite as defective as the French, but it is noticeable that quotations of arms in Belgium are considerably lower than in France. A common breech-loader marked in Paris 90 francs is quoted 56 francs in Brussels. The commonest muzzle-loader, a double gun, sells as low as 14¼ francs, and a single gun of equal quality is quoted 6 francs; but neither are safe to use.

Again, the Belgians have a very soft and easily workable malleable iron, which they know how to cast to perfection; and they make a very liberal use of it indeed in the manufacture of their revolvers. The bodies, the barrels, and sometimes even the chambers, are made of it, and every workman knows how much easier it is to file up a clean casting in soft iron than a lump of wrought iron, however shapely it may be forged. This is a very important item in the cost. Soft as the iron may be, the pistols are made very light, but the metal is evenly distributed. Even the hammers and triggers are made of cast iron. The springs have not much strength, but sufficient to strike a pin cartridge, and for pin cartridges the Belgian revolvers are invariably made. They are at the outset cheaper than English revolvers, but they do not last so long, and therefore in the long run they are dearer.

The best guns of Prussian make are chiefly remarkable for their very chaste and elaborate decoration. In other respects they are heavy, and have great cheek pieces on the butts. In the Prussian needle gun, as in the chassepot and other military breech-loaders of note, one leading idea seems to prevail. This is the opening of the breech by the pulling back of a bolt, which, when the charge is inserted, is pushed home and turned down.

In the Snider another plan is adopted. A solid block is lifted out of the breech, pushing the charge into the barrel in front of it, and replacing it. The various ways of hinging this block and securing it when down form half the varieties of breech-loaders. In one the block turns over to the right, in another to the left; in one backwards, in another forwards; all differing in some minor, though perhaps essential, detail, but the leading idea is the same, and had its origin, no doubt, in the Armstrong gun.

The method of converting the Enfield into the Snider rifle is very simple. About two inches of the upper part of the Enfield barrel are cut away at the breech, and a solid breech stopper working sideways on a hinge is placed in the opening thus made. A piston passes through the stopper, and when the breech is closed, one end of it receives the blow from the hammer, and the other communicates it to the center of the cartridge, and fires it. There is an arrangement for withdrawing the old cartridge cases after each discharge.

Casting a Steel Ingot.

A casting designed for the beam of the screw steamship *Munster*, belonging to the City of Dublin Steam Packet Company, has just been made at the Norfolk Works, Saville street, Sheffield. The mold in which the ingot was cast was upwards of 14 feet in length, and 3 feet in diameter, and was fixed in the middle of the principal melting furnace. About 300 men were in attendance, under the personal superintendence of Mr. Mark Firth. Almost military precision was observed in bringing from distant parts of the works the crucibles containing molten steel ready to be poured into the mold. This was fixed in a central position, and close at hand were 150 "holes," with tributaries from many other parts of the premises, and we believe that altogether there were 270 in operation. In about half an hour the contents of 544 crucibles, of 64 lbs. each, were poured into the mold, making a total of 34,816 lbs.

Bromine and Iodine.

The bromine of commerce was derived mostly from salines until the salt mines of Stassfurt were opened. The method of manufacture is similar to that followed in the separation of iodine.

Upon opening the mines at Stassfurt, bromine was found in the mother-liquors in considerable quantities, and at present the principal part of the European product is derived from this source. As high as 300 grns. per gallon have been obtained from these mother-liquors. Although but two or three of the manufactories at this place have economized this substance, the price of bromine has greatly decreased during the last five years. This decrease has been hastened by the large production of bromine in the United States.

Although the amount of bromides in the Saratoga waters is considerable, yet the comparatively limited flow of water here and the large consumption of these waters for medicinal purposes precludes the manufacture. But from the strong salines our supply is derived in large quantities. At Tarentum, Sligo, and Natrona, in Western Pennsylvania, Pomeroy, Ohio, and Kanawha, West Virginia, the manufacture of bromine has become of considerable importance. The production of 1870 will reach 126,000 pounds, a quantity probably in excess of our consumption. In 1867 the Stassfurt product of bromine was nearly 20,000 pounds.

The total product of iodine in Great Britain and France is about 200,000 pounds annually, and outside these two countries very little is produced. As the average product of iodine is about ten pounds to the tun of kelp, and it requires twenty tuns of wet weed to produce one tun of kelp, this total product represents the burning of 400,000 tuns of sea-weed. At the present price, the iodine produced is of more value than the alkaline salts, which were the original object of the industry.

Iodine is not produced in the United States. Since its use was first established here the price has fallen from $16 to $5 per pound. At present, bromine is furnished for less than $1·50 per pound.

The chief consumption of iodine and bromine is for medicinal purposes in the form of iodides and bromides of potash, soda, or ammonium. A small proportion is consumed in photography. Bromine has been proposed as a discharge in calico printing, and during the late war was to some extent employed as a disinfectant. As yet, but a small proportion of the bromine of the saline mother-liquors is economized; but should the manufacturers turn their attention to this important substance, the consequent reduction in price will render its economical employment in other directions possible —*American Chemist.*

A House Built by one Man.

The *South London Press* tells a story of perseverance. About four years ago an eccentric personage, who follows the pursuit of bird-catching, purchased a small plot of land on the eastern side of Nunhead Cemetery. Here he resolved to build a good-sized six-roomed brick house with his own hands. He at once set to work, and, strange to say, has nearly finished his task. He has been his own architect, his own bricklayer, his own laborer, his own joiner, his own plumber and glazier, and, what is still more strange, has built the house without one particle of scaffolding, and even carried his own bricks from the maker by the armful as he was able to afford them. The work is said to appear very substantial, and to do him great credit. During the operations he has been living in a small brick hut, built by himself on the plot at the outset, in company with a little son and a loquacious parrot. He probably thought himself a second Crusoe on an uninhabited island, and behaved as such.