SAFETY SELF-COCKING ARMS.

Portable firearms, to perfectly meet all requirements, should combine three essential elements—compactness, rapidity of action, and safety in handling. The only advantage of revolvers, as compared with repeating rifles, is their smaller bulk and weight, as they are inferior in rapidity of firing, and still more so in accuracy and penetrating power. Among revolvers, again, the ordinary hand-cocking revolver is superior in safety and compactness to the self-cocker, but greatly inferior to it in rapidity of firing. Self-cockers, as usually made, are clumsy and particularly dangerous to handle, and this has overweighed the advantages they present for rapid firing. A compact and safe self-cocker which avoids these difficulties is shown in the engraving.

The usual bulky open guard and the fixed projecting trigger are replaced by a low-closed guard and a folding trigger, shown in Figs. 1 and 2. The dotted lines, *a a*, show the position of the parts dispensed with, and show how much is gained in compactness by this improvement. The folding trigger, B, Figs. 2 and 4, is readily projected from the guard, C, by pressure on the lugs, *b b*, placed on either or both sides of the trigger, and assumes the usual position of the trigger shown by dotted lines in Fig. 1. The lugs, *b b*, on the trigger, and the slots, *d d*, in the guard to receive them, are placed so that the trigger cannot be folded back into the guard when the hammer is either at full cock or entirely down, but only when it is at the safety notch, or at half-cock. This impossibility of securing the trigger in the guard unless the hammer is at half-cock, is a very ingenious and effective means of preventing the many accidents which result from arms carelessly carried with the hammer in a dangerous position. The very simple device of slitting the trigger longitudinally in the manner shown in Fig. 3, transforms the trigger itself into a spring, and retains it in the guard by friction when folded up.

The face of the hammer, when at half-cock, is protected by a shield or hood, E, Fig. 1, and the usual thumb-piece being dispensed with, there are no projecting parts susceptible of catching and causing an accidental discharge of the arm. The roughened top, F, of the rounded hammer, is found to practically answer the same purpose as the thumb-piece, in bringing the hammer to full-cock by hand, as soon as the hammer is brought beyond half-cock by the trigger. Altogether, a self-cocking revolver of this model is lighter, more compact, and safer than the usual revolver, and infinitely more so than the usual self-cockers. The current form of self-cocking revolvers can readily be modified to this system, which can also be adapted to other kinds of firearms, and es pecially to the now popular styles of so-called "hammerless" guns.

For further information address the patentee, Mr. J. N. Proeschel, at Milwaukee, Wis.

SAFETY SELF-COCKING REVOLVER.

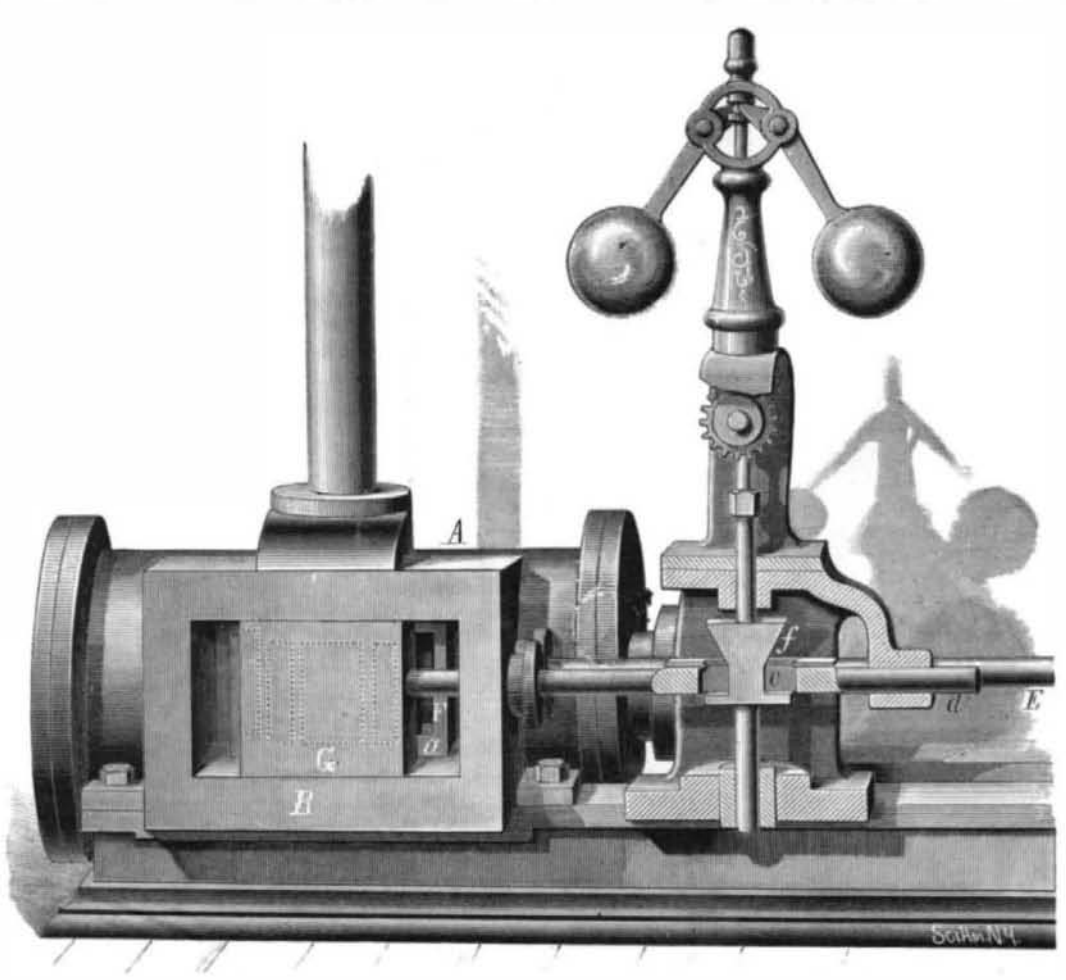
NEW ENGINE CUT-OFF.

This invention relates to a variable cut-off for the ordinary slide valve steam engines, which is rendered automatic by connection with the governor, the combination being very simple and effective.

In the engraving, A represents the cylinder, and B valve chest of an ordinary steam engine. The eccentric rod, E, is connected to a gridiron valve, F, having steam ports, *a b*, and an exhaust port, C, working in conjunction with the steam ports and exhaust ports of the cylinder, as usual. On the back of the valve, F, is a plate, G, forming the cut-off valve, this plate or valve being held firmly against the back of the valve, F, by the pressure of steam, and being dependent for its movement upon this frictional contact with the valve, F.

A stem, *d*, projects from the plate or valve, G, through a stuffing box in the valve chest, and this stem is provided with a yoke, *e*, which embraces a wedge-shaped block controlled by the governor. The wedge, *f*, thus acts as a stop to limit the extent of movement of the cut-off plate or valve, G, the movement being contracted as the wedge is depressed, and an increased movement being permitted as the wedge is raised, the variations in the movement of the plate, G, are caused to regulate the cutting off of the steam to the cylinder. The wedge exerts no control, practically, over the movement of the valve, G, the latter moving with the valve, F, throughout the entire throw of the latter, so there is no resistance of the entrance of steam into the cylinder from the beginning almost to the end of the stroke, hence there is no labor on the governor except to raise and depress the wedge; the wedge shortens the throw of the valve, G, and thereby cutting off the steam proportionably with its position.

Further description being unnecessary, except that if the governor should stop from any cause, such as the breaking of the belt, the wedge-shape block has an enlarged portion, so that its position in that case will be inside of the yoke on the valve steam, *d*, and shorten the stroke to limit the speed of engine. Further information can be had by addressing Orr. Hess & Morgan, 1219 Callowhill street, Philadelphia.



IMPROVED ENGINE CUT-OFF.

A Mediæval Guillotine.

The Chapel Bridge, at Lucerne, contains a mediæval painting representing the persecutions of the Helvetian Christians under the pagan Emperors of Rome. On the right side of the picture a number of Christians are being hurled into a river, perhaps the Reuss. On the left side a very evident guillotine is erected, one Christian lies with his head on the block, and the huge iron is just about to be let drop upon him, while a number of headless bodies lie around with the heads close beside them. It is commonly believed that this decapitating machine was the invention of Dr. Guillotin, a French physician, and member of the National Assembly of 1789. The Lucerne painting was made at a much earlier date.

Engineering at the Washington Monument.

The Washington monument is too near to be ever regarded by Washington people as anything out of the ordinary run of things. Few people here ever stop to think what a feat of engineering has been undertaken in the construction of this monument. "There is nowhere in the world such mechanical appliances as we have in the monument," said Colonel Casey to a *Star* man. "The last course of stone laid weighed 170 tons Now this 170 tons was raised vertically a distance of 245 feet, and the course was laid in fifteen hours. In other words, two feet of the monument was built in that time. You haven't any idea of the amount of stone and the amount of work required to build the monument. The stone we have laid since the work was resumed, if taken down and spread out, would cover the entire monument lot. At a distance the monument looks small; the yardarms on the derricks on top look like broom splints; but when one gets nearer them and sees how large they are, how wide the structure is, he gets some notion of the work."

If the monument was being constructed in France, or some other European country, the name of the engineer would already be famous, and when his work was finished, if it was approved, he would receive a fortune as his reward. It is doubtful whether the engineer connected with the Washington Monument will ever have any special recognition by the government. He will never receive any pecuniary recognition. An old engineer officer, speaking of this matter, said: "If Colonel Casey was not in the army, and had charge of one of the several works for which he is now responsible, his salary would be $10,000 or $15,000 a year ; as it is now, he draws $3,000 a year. The government pays too high figures for services rendered in inferior places, and much too little for professional services. —*Washington Star.*

The Severn Tunnel.

After some rather formidable difficulties, the two main headings of the Severn tunnel, in course of construction for the Great Western Railway Company, were united on the night of September 26 last, and a clear passage thus made under the bed of the river. The difficulties have been brought about chiefly by the flooding of the headings, which occurred now nearly two years ago. Water from springs in the surrounding hills on the Monmouthshire side drove in a large mass of the somewhat fractured pennant sandstone through which the tunnel passes, and so filled the workings on that side. The heading on the Gloucester side also filled, and the work was stopped, as described in our impression for the 24th October, 1879. There was at that time only 120 yards of the heading remaining to be driven. Very powerful pumping machinery was then put to work under the contractor, Mr. A. T. Walker, to whom the completion of the tunnel was let, and the work of driving the heading was resumed after several months' delay. The meeting of the two headings shows but three inches of divergence, and considering that the distance driven has been upward of two miles, that the headings are 7 feet high, with a width of 7 feet, started from a base of only 15 feet, the work, it will be seen, reflects great credit on the skill and attention of the engineering staff. It should be mentioned that the heading from the Monmouthshire side was driven 11,000 feet from the bottom of a shaft 180 feet deep. This was a very wet shaft, and there was very great difficulty in seeing down or getting plumb lines steady on account of vibration caused by the pumps. The Great Western Railway Company constructed the heading on the Monmouthshire side by its own officers, and up to the time of the stoppage on the Gloucestershire side, Mr. Oliver Norris, then contractor, had driven 1,680 feet, this heading being driven on a decline of one foot in a hundred. The remaining portion was carried out by Mr. A.