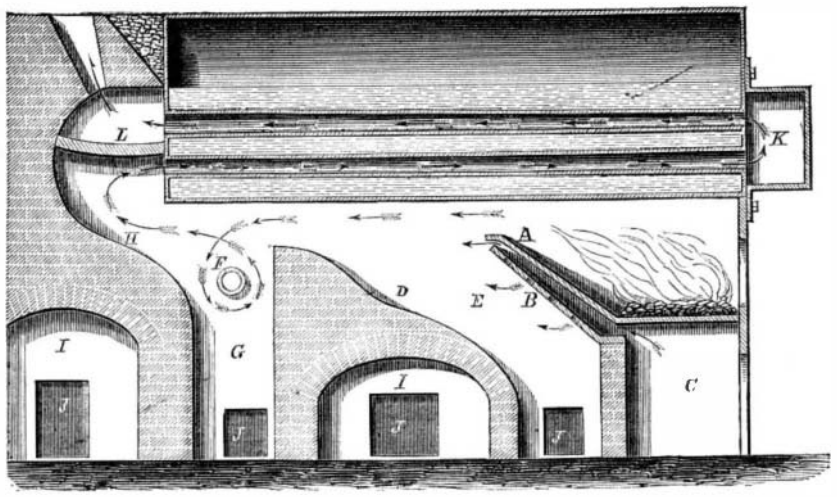
Another Mode of Setting Boilers.

Messrs. Editors:—In your issue No. 9, Vol. XVII., front page, is an article, with an illustration, from Mr. F.W. Bacon, for the setting of steam boilers, which contains many excellent suggestions. Having given this subject much study, I here present a diagram of the result thereof, merely stating that it had been my intention to apply for a patent therefor, but now, if it is worthy of any merit, it is freely given to the public for the general benefit.

The main features of this invention consist: 1st, In a metallic fire wall, A, luted or covered with fire-clay cement, and set at an angle of 45°. 2d, A perforated plate, B, running nearly parallel with the former, leaving an air space between the two about two inches at the upper edge, and three inches at the lower. This air space to be the full area—both longitudinal and cross section—of the fire wall, A, and to communicate with the heated air in the ash pit, C. 3d, The fire wall, D, of the gas chamber, E, extends to three-fourths the length of the boiler, with a waved incline to admit of the natural circular sweep of the incoming gas, the precipitation of ashes, dust, etc., the easy outgo of the flames, and the direct radiation of the heat to the surface of the boiler. 4th, An air pipe, F, in the gas space, G, regulated by a damper, to allow of a full admixture of air, and consequent combustion of any gas that may have escaped the chamber, E. 5th, The rounded sweep for the flames by arch, H, and the continued widening of all the flue spaces from first arch at A, to final entrance to chimney proper, which should also be of greater area than the combined flues. 6th, The drying oven, I I, for timber and fuel. J J represent the doors of the ash pits and the drying kilns, K the connecting bonnet between the flues at their return end, and L the division or partition between the flues.



CHAPMAN'S SYSTEM OF BOILER SETTING.

The action is thus:—The flames, passing over the metallic fire wall, heat it red hot, which heats up the air passing in the air space, E. This heated air, passing through the perforations of plate, B, mixes with the gases eliminated by the fire, and without reducing their temperature, causes them to ignite with rapidity, while the peculiar form of the bed of the gas chamber allows them to mix freely and have an easy egress. The old-fashioned, square walled chambers and fire back cannot help impeding, fearfully, the beneficial working of any boiler fire; a side look into any furnace thus constructed will show the great loss thereby occasioned, and the wonder is that any draft at all is obtained. The incline in the fire walls and those of the gas chamber are natural deductions, and work as well in practice as they appear in theory. The air pipe, F, supplies any deficiency of air necessary to consume all the remaining gases at the entrance to the boiler flues, and is easily regulated by a damper. The flue spaces, also, are steadily enlarged as the length increases, so as to insure a powerful draft and perfect combustion. Advantage is taken of the peculiar gas chamber bridges to build ovens for the convenience of drying fuel, as in saw mills, or for other purposes.

Thus it will be seen that the flames have a continuous, unchecked roll and sweep, that the gases are mixed with an air as hot as themselves, igniting and mixing easily, and that all the reflecting facets have their right angles to the boiler, no heat or hot gases are lost, and the dust and ashes are well under control. The plan presented represents a three-flue boiler, but it applies to any other.

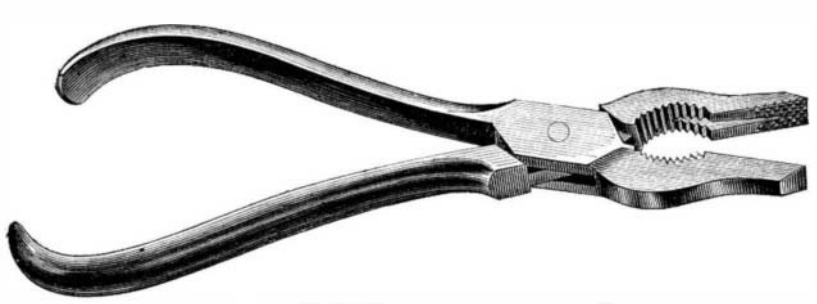
Penrose Chapman.

Brunswick, Me.

The inclined and perforated bridge wall and back appears to be a very desirable improvement. The sweep of the after walls is also a good idea, but it seems to us that the air-pipe, F, is introduced too far from the fire to insure heat enough to properly consume the carbonized gases.—[Eds.

Improvement in Hand Pliers.

The engraving presents a perspective view of a pair of improved pliers, patented in the United States January 8, 1867, and for which patents are now pending in Europe. The only change from the ordinary pliers is the form and adaptability of the jaws. It will be seen that the end portion of the jaws are adapted to all the uses for which the ordinary flat pliers are intended. The bent portion of the jaws are toothed, as seen, and are intended for turning gas burners, holding round rods or bolts while removing rusty nuts, for the use of druggists for compressing corks, and also as an ordinary nut cracker. The tapering groove in the straight part of the jaws is intended for holding wire, rivets, or screws for fitting by the file, thus serving the purpose of a hand vise. No more particular reference to parts is necessary, as the illustration is plain enough for any one to understand. The improvements appear to be capable of being turned to good account and we think they are really valuable.



WALKER'S COMBINATION PLIERS.

The patentee, Sylvanus Walker, may be addressed at 59 East Chester Park, Boston, Mass. He is willing to sell the whole right for the United States or to make arrangements for the manufacture of the pliers on a royalty.

TRIALS OF BREECH-LOADING RIFLES. COMPETITION, 1867.

We had hoped before this to have placed before our readers engravings and detail particulars of the nine rifles which have been selected for future trial from the 112 sent in to Woolwich for competition. Circumstances, however, beyond our control have delayed the matter, so we purpose now to give a general description of these selected arms, hoping in a short time to furnish full details. In order to avoid any appearance of invidious distinction, we will take the names of the competitors in alphabetical order. The weapons, then, are—the Albini and Braendlin, the Burton (two systems), the Fosbery, the Henry, the Joslyn, the Martini, the Peabody, and the Remington rifles. The Albini and Braendlin rifle is a small bore, ·462 of an inch caliber, having the breech-block hinged on to the rear end of the barrel. It is opened by a small knob on the right hand side of the block, which, when open, rests on the barrel. The cartridge is inserted in the breech-chamber, and the breech-block returned, by which the chamber is closed. As the hammer descends, it acts upon a bolt which secures the breech-block, and at the same time transmits a blow to a piston enclosed in the breech-block, and by which the cartridge—central-fire—is ignited. On opening the breech again an extractor, working on each side of the barrel, removes the cartridge case. We believe that the Albini system, firing the Boxer cartridge, has been adopted in the conversion of the rifles of the Belgian army. The first of Mr. Burton's two systems is a central-fire, large bore, ·577 of an inch diameter. The breech-block is hinged under the barrel, and is opened downwards and towards the muzzle by a small lever in front of the trigger guard, which it somewhat resembles. The piston is carried in the breech-block, and its return after firing is effected by the lowering of the block, which also extracts the cartridge shell. Mr. Burton's second system is of the same caliber, but on the plunger principle, after the fashion of the Prussian needle-gun, which in outward appearance it somewhat resembles. The great distinction between the two, however, is that the needle-gun, as our readers are aware, consumes its own cartridge case, whilst the Burton gun is adapted for the Boxer cartridge. The plunger is locked by a small boss formed on its upper side, and which takes into a slot in the shoe on the plunger being pushed forward by a knob similar to that on the Prussian gun. The front end of the plunger carries an extractor by which the cartridge case is withdrawn after firing.

The Fosbery rifle has a ·568-inch bore, and a breech-block hinged and opening over the barrel in the same way as the Albini rifle. The breech-block is opened by the sliding motion of a knob, fixed on the right side of the arm just below the breech-block. This knob acts on a curved lever and on a wedge-piece, the arrangement allowing the breech to be rapidly opened and closed, the extractor being worked from the same action. The Boxer service cartridge is used, and is exploded by a piston passing through the breech-block, the block being locked by a bolt acted on by the tumbler. The fifth system is that of Mr. Henry, and is a small-bore rifle, 455-inch caliber, using the Boxer cartridge. Here the breech-block has a vertical sliding motion, which is obtained from a lever fitting closely under the trigger guard. The piston takes a diagonal direction through the breech-block, which is provided with an extractor. The next arm for notice is the Joslyn rifle, which has a very neat and simple breech arrangement, and is adapted for the rim-fire copper cartridge, although it may be used for either rim or central-fire. The breech-block—or, rather, breech-cap—is hinged on the left side of the barrel, and is opened by a small knob acting on a spring catch on the right side, which has to be withdrawn and not pressed inwards, so that opening from accidental pressure is impossible. The rear end of the barrel is encircled by a raised metal rib or projectiou, fitting into a corresponding recess in the breech-piece. This secures the block against any back action in firing, whilst it is locked by the spring catch already noticed. For further security the nose of the hammer fits into a cupped recess on the rear of the breech-block, and into which the head of the plunger protrudes. Thus, were the hinge and catch to be removed—as, in fact, they have been in some private trials—the breech-block would be securely held in position during the discharge of the piece. The extractor is worked by a wedge cam attached to the hinge and joint of the breech-cap, and by which the cartridge case is ejected with ease and certainty.

The Martini rifle next demands our attention. It is a small-bore arm, of ·433-inch caliber, and in which the ordinary lock is replaced by a spiral spring and piston, no hammer being visible. The rear of the breech-block is hinged to the breech-frame, and the depressing of a lever behind the trigger guard opens the chamber for the insertion of the cartridge. As the breech is opened, the empty cartridge case is extracted, and the piece cocked. This arm is adapted for the copper rim-fire cartridge. Our readers may probably remember the next arm, the Peabody rifle, which we described last year. This rifle has a bore of ·5-inch, and is of somewhat similar construction to the Martini rifle. It, however, has a lock and hammer, but otherwise is designed for the copper-cased rim fire cartridge. The rear of the breech-block is hinged to the frame whilst the fore part is depressed by the action of the trigger guard, which forms a lever, as in the well-known Spencer repeating rifle. The top of the breech-block is grooved and acts as a guide for the cartridge, whilst it allows of a very small depression only of the block. The cartridge case is quickly extracted by a lever acted upon by the breech-block. The Remington rifle is of the same caliber as the Peabody, and is fired with the Boxer small-bore cartridge. The breech end of the barrel is closed by a stop, which works on a pivot centered below the barrel. The breach end of the barrel is strengthened by a metal hoop or band, against the rear edge of which the stop takes its bearing. The stop is held in position by the action of the lock, and the objection which we once raised to this arm—that the locking arrangement was not thoroughly reliable—appears to be removed in the present example. It would be manifestly unfair and illiberal on our part to enter upon a discussion of the comparative merits of these weapons without having had an opportunity of practically testing them, or, at any rate, of manipulating them. Some we have tried, whilst others we have not handled, which would render discussion on our part still more unfair. We trust, however, that we shall shortly be able to place the matter fully before our readers with all its interesting details. Before concluding, however, we may give the results of the firing at the official trials in the following tabulated form, and we now place the weapons in order of merit for rapidity, to which arrangement they are fairly entitled:—

Joslyn	12	shots in	47	seconds.
Martini	12	"	48	"
Fosbery	12	"	50	"
Remington	12	"	50	"
Burton No. 1	12	"	57	"
Henry	12	"	57	"
Albini and Braendlin	12	"	61	"
Burton No. 2	12	"	62	"
Peabody	12	"	63	"

It will thus be seen that the Joslyn rifle heads the list, while the Peabody is last, and then the 12 shots include three miss-fires. Fosbery and Remington are ties, as also are Burton (No. 1) and Henry. In justice to some of these arms we must say we have seen quicker practice with several of them in private grounds, and apart from the disturbing influences of an important public competition. The Joslyn rifle, for instance, only attained a rapidity of fifteen rounds or so per minute, which we know to have been far exceeded on other occasions. And the same of one or two other weapons. The Joslyn rifle gave some very good results at the late Wimbledon meeting, and is a recognized military arm in the United States. The Remington rifle has been largely tried in America, France, and Austria. The present position of the competition is this: The nine selected competitive systems are now awaiting the further and exhaustive trial which may be expected to take place about four months hence. To this end each of the accepted competitors has to furnish six rifles and 6,000 rounds of ammunition. When this has been consumed, we shall, no doubt, know what will be the English small-arm of the future.—*London Mechanics' Magazine.*

Single-Cylinder Marine Engines.

The American engineers have generally insisted that their single-cylinder marine engines seldom or never stop on the center. But we see in the *Scientific American* an illustration and description of a hydraulic jack for getting the cranks off their centers. It is patented by the superintending engineer of the Pacific Mail Steamship Company, Mr. W. H. Vanderbilt, a near relative, we believe, of the well-known "Commodore" Vanderbilt, one of the very largest owners of steam shipping property in America. We conclude, therefore, that Mr. Vanderbilt *has* had his single engines sticking on their centers.—*Engineering.*

[The main reason why our single-cylinder engines do not stop on the center is that the engineer is so skillful and the engine valves are so completely under his control that the drag of the wheels can rarely affect the engines in carrying the crank too far. The invention alluded to is intended only for infrequent contingencies.—Eds.]