Submarine Firing.

As this subject is one that now attracts attention, we publish the following extracts from a record of Robert Fulton's experiments:—

"With this view he instituted a number of experiments to try the practicability and effect of discharging cannon loaded with ball at different depths under water. He made a number of calculations on this subject. His desire was to ascertain what resistance a ball, of given dimensions, propelled with a certain velocity, would meet with in passing through a body of water at a certain depth. The basis he took for these calculations and the calculations themselves mark both his ingenuity and science. He assumed that a body passing through water would meet with a resistance equal to the force of a column of water of the same diameter as the body moving with the given velocity. He then ascertained what head or weight of water would be required to discharge a stream of water from an orifice at the foot of a perpendicular tube with the same velocity with which the body was supposed to be propelled. He then, by the well-known rule of hydraulics, found what force or power the ascertained head of water would give, and thence formed his estimates as to the resistance which a body projected in water would meet with.

"In this instance, as in others, he was not satisfied with arriving at the information necessary for his particular purpose; but he established from his calculations a rule which may, by a very brief and simple arithmetical process, afford all the information and accuracy generally necessary for practical purposes. His first experiment was with a four-pounder, having the breach, and as much of the gun as is usually within the sides of a vessel, in a water-tight box, and the muzzle stopped with a tompion. The box and gun were then submerged three feet in the Hudson. The gun was fired by dropping a live coal through a tin tube which penetrated the box immediately above the vent of the gun, and rose above the surface of the water. The ball was found to have struck the sand at the bottom of the river, at the distance of forty-one feet from the muzzle. The gun was uninjured.

"This experiment satisfied him that guns might be placed in a ship, below her water-line, with their breech on board and their muzzles in the water, without any more danger of their bursting than there is when they are fired in the air. This gave him the idea of arming ships with guns to be fired in this way. He proposed that the muzzle of the gun made for the purpose should recoil through a stuffing box, and be followed by a valve, which would exclude the water when the gun was not protruded. An elegant model on this construction is now in the possession of his family. He next tried the same piece with a pound and a half of powder, and fired it by means of one of his water-tight locks, when it was entirely in water—three feet below the surface. The ball penetrated eleven and a half inches into a target of pine logs, which had been prepared for the purpose and placed beneath the water at the distance of twelve feet from the piece.

"His next experiment was with a columbiad, carrying a hundred-pound ball, fired at the target as in the last instance. All that we know is, that the ball tore the target to pieces and the cannon was uninjured. We have not information that will enable us to give any further details of this experiment, but we know that Mr. Fulton was entirely satisfied with the result. He proposed to use cannon in this way by suspending them, two for instance, from the bows of the vessel. A single shot, as he demonstrates, from a piece of large caliber, which should break into the side of a ship at any considerable depth beneath the water-line, must be fatal to her. And though the range of shot fired through water may be but a few feet, yet conflicting vessels, whenever they engage yard-arm and yard-arm (with accounts of which our naval heroes have of late made us so familiar), must be so near as to give effect to a submarine discharge.

"Mr. Fulton did not propose that these guns should be always in the water, but that they should be suspended so as to be raised when the vessel was not in action. These plans for the submarine use of cannon were submitted to one of our most distinguished naval commanders, who gave them his decided approbation. He expressed a strong opinion that such an attack would be fatal to any vessel opposed to it; and that it would be extremely difficult for an enemy to evade an attempt, made with sufficient resolution, to destroy her by these means."

A Country without a Reptile.

Capt. Hardy, R. A., writes an interesting letter to the *Field* newspaper, commenting on a statement that in Newfoundland there is not a snake, toad, frog, or reptile of any sort; nor any squirrels, porcupines, mink, or mice. Capt. Hardy says:—"Besides the above-mentioned deficiencies, I found, when visiting Newfoundland last summer, several others. It was midsummer, and the fire-flies were scintillating in myriads in the warm evenings over every swamp in Nova Scotia; here not one could be seen, nor was there another pleasing summer visitor of our neighboring provinces—the night-hawk. Considering the immense portion of this island which is claimed by bogs and swamps, I think the absence of all reptiles very curious; and I plodded long and often round the edges of ponds and swamps, hoping to see some little croaker take a header from the bank; and by sunny slopes in the woods, where, on the mainland they might be seen at every other step, in search of snakes, but all in vain. I believe some of our common green-headed frogs were recently transported to this island and turned out into a swamp such as would be a grand residence for them at home, but in a few days, alas! they all lay stiff on their backs. In fact, Newfoundland seems to be destined to remain as it now indubitably is—a country without a reptile."

American Cast-iron Guns.

The Toronto *Globe* has the following paragraph commenting upon the performance of the XI-inch gun as shown by the targets recently illustrated in the Scientific American:—"We suppose we should not be justified in arguing that in these experiments we have a sample of the best the American guns can do, but we are warranted in presuming that it offers the fair average performance of the XI-inch cast-iron Dahlgren. We cannot think it otherwise than very poor, far below the expectations we had been led to form from the system of puffing adopted. That the slight effect the shot had is not attributable to the india-rubber used in the target, is evident from the report of the officer, who says, in effect, that it penetrated just as far as in targets minus the additional protection. It is attributable to other causes, easily seen. Although the gun was only eighty-eight feet from the target faced with four and a half inch solid iron, in no instance did the shot pierce its way entirely through. We think we can show a far better record with English guns than this."

[The editor of the *Globe* has read the reports very carelessly; for just above this paragraph, in his own paper, he records the fact that the shot passed clear through. Not one target resisted them in any case.—Eds.

The Oil Supply.

The question of the ability of the oil region to supply continually the demand now made for petroleum is one which is discussed by those interested in the production and trade of the article. The wells which have been sunk are found frequently to diminish in production, and the vicinity of other wells is found also to diminish the productiveness of old wells. From the frequent striking of mud veins, it is assigned by some that the oil supply is becoming exhausted, and that these mud veins are the bottom or bed of the deposit. Some owners have found it advantageous, when a well gives out, to sink it deeper, where they find it yielding an additional quantity, which leads to the supposition that there exists several superincumbent layers of the peculiar mineral from which petroleum is derived, and the oil may be procured at the depth of a thousand feet, as surely as it is at the depth of five hundred feet. This is a matter which has yet to be tested by experiment, but the fact is a highly important one as connected with the permanent supply of an article which has become so considerable an article of trade.

Statistics of the "Reaper" Trade.

But few persons not actually engaged in the enterprise have any very definite idea of the immense proportions the business of manufacturing reapers and mowers is assuming in this country. We have reliable information, says the *Prairie Farmer*, that there were made for the trade of 1862, 33,000 of these machines; for that of 1863, something over 40,000; and, for the business of the present year, upwards of 70,000 will be made. Mark the wonderful increase since the war began. Out of the 70,000 between 14,000 and 15,000 will be manufactured in the State of Illinois. Seventy thousand machines at an average of $130 dollars each (combined machines selling the ensuing season, $150 to $160, or even higher, and mowers from $105 to $140), and we have the enormous amount of $9,100,000 paid by the agriculturists of the North, in a single season, for a single class of instruments. Probably the repairs on machines, old and new, will swell the amount to nearly $11,000,000. Can any country in the world equal or even approach these figures?

SPECIAL NOTICES.

Stephen R. Parkhurst, of Bloomfield, N. J., has petitioned for the extension of a patent granted to him on April 23, 1850, for an improvement in cotton gins.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, April 4, 1864.

William Van Anden, of Poughkeepsie, N. Y., has petitioned for the extension of a patent granted to him on April 30, 1850, for an improvement in machines for making wrought-iron railroad chairs.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, April 11, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

The American Institute Clubs.

The members of the American Institute have two societies, the Polytechnic Association and the Farmers' Club, both of which hold weekly meetings free to all persons who choose to attend. The meetings of the Farmers' Club are held at 1½ P. M., on Tuesday, at Room 24, Cooper Institute, and those of the Polytechnic Association at 7½ P. M. in the same room. We intend to publish reports of such portions of the discussions of these societies as we think will be interesting to our readers. We wish it distinctly understood, however, that we cannot waste our time and space to notice every "bore" that thrusts himself into these meetings. Whatever is intrinsically good we shall publish.

The Potato Rot.

At the last meeting of the Farmers' Club, Mr. Carpenter said:—"I have read and observed a great deal on the subject of the potato rot, and the sum of the whole seems to be that potatoes planted in moist tenacious soils are much more subject to rot than if planted in dry ground."

Prof. Mapes remarked:—"I had a field, half of which was under-drained, and I planted the whole to potatoes. On the under-drained portion none of the potatoes rotted, while on the other half they all rotted."

Mineral salt is now brought in ballast from Russia; it sells for $20 a tun. It is mined in blocks that to the eye appear to be quartz. A thirty-pound block of it, placed in a box in a field, will supply a herd of cows for some weeks. It is as hard as stone. Ordinary salt would dissolve in one-fourth the time. No other country yet known yields this peculiar product. It is quarried precisely as we quarry marble.

Rimmers must not be used in the cored-out holes of castings. The scale and sand ruins the tool in a short time.

Pickling castings of iron is the best way to remove the sand adhering. One bulk of sulphuric acid to ten of water is a good bath.

The New Haven Clock Company manufactured 200,345 "movements" last year, 20,000 of which were exported.

When chipping wrought-iron the chisel should be dipped in greasy waste, occasionally; the labor is much reduced thereby.

Improved Feed-cutter.

Hardly any innovation of the day is more remarkable than the change of opinion and practice which has taken place in feeding cattle and other stock. Twenty years ago rough feed, or hay in bulk, and such fodder was thought fully sufficient for stock, and the change which has taken place in this respect is very marked. The columns of the various agricultural papers in this country are continually occupied with discussions upon the subject of stock raising, food for horses, cattle, &c. By some, chopped feed is recommended, by others cooked roots, &c., and each and all kinds, methods and plans are animadverted upon in turn to the great benefit of the farmer.

The subject of the engravings presented herewith is a new machine for cutting feed, hay, straw, corn-stalks, &c., and embodies in its construction some points not hitherto embraced in machines of its class. It will be seen on referring to Fig. 1, the perspective view, that the machinery is mounted on a wooden frame, A. The material to be cut is entered at B, and is drawn under the knife, C, by the action of the rollers. The knife is somewhat peculiar inasmuch as it is so made that it will produce a drawing cut, and enter the fodder gradually and without shock or jar; it is fastened to the arms, E, which have counterbalances, F, on their opposite ends, so as to make the machine work regularly and without vibration; for the knife runs at a high velocity. The edge of the feed-board, B, is provided with a metallic edge, against or up to which the knife works so as to clear it. This plate can be moved up so as to compensate for wear. The action of the feed rollers is a novel feature of this machine, for no matter what the thickness of the substance cut, they are held always in the same relative position with the knife, from which circumstance they work much more efficiently. This action is obtained in the following manner:—There are two feed rollers, G and H; the latter having ribs to assist in performing its functions. The shaft of the feed roller, H, runs in bearings in the bars, I (see Fig. 3), one upon each side of the machine. These bars are connected to each other at the bottom by a rod, and to this rod a spiral spring, J, is attached (see Figs. 2 and 3) which runs to the bottom of the frame and is there permanently fixed. The upper ends of the bars, I, are connected to each other by a board or thin iron plate, K, to the back of which another plate, L, is attached, as shown in Figs. 2 and 3. The spring, J, keeps the upper roller down upon its fellow, and the shaft of the upper roller has two hubs, one on each end, which work in curved slots, M, made in the plates, N (see Fig. 2), set on each side of the feed box. These slots are struck from the center of the cutter shaft, therefore as the upper roller rises with the feed introduced to it, it is always in the same distance from, or relative position, with the cutter. By this feature of the machine the fodder is firmly held to the knife and the best possible results obtained. The gearing to effect the rotation of the roller, H, is thus arranged. The lower roller has a pinion, O (see Fig. 3), attached to its shaft, said pinion driving another one, P, which runs in the curved bar, Q; this pinion gears with another, R, above it, constituting a train of three wheels. The pinion, R, engages with a fourth wheel on the shaft of the upper roller, and is kept to its work by means of a link, S, between the two; by this arrangement the rollers are driven continuously without interference with the position of the upper one. The board, K, is attached to prevent hay from being drawn over the top of the upper roller; this board works up and down with the roller. There is also a sheet-iron guard, T, which prevents the cutter from being injured, as well also hay from flying to waste all over the floor, and the cut feed is delivered through the chute, U, into bags or baskets as may be desired. There is one other peculiarity about this machine which deserves notice; this is to prevent injury to the knife or cutter from any hard substance which might accidentally or designedly be introduced with the fodder to be cut. The fly-wheel, V, is fastened to its shaft by a nut and washer; there is no key in it, as is usual, and the adhesion necessary to enable it to perform its duty, is given by the nut aforesaid in connection with two wide collars. The idea of this arrangement is to allow the fly-wheel to slip on its shaft when the cutter strikes a hard substance, thus taking the strain due to its momentum off from the cutter—a very simple and excellent contrivance. The cutter shaft is driven by the spur gear, W, and a pinion, and has a high velocity. The other gears, on the opposite side of the machine in Fig. 1, work the lower feed roller.

Fig. 1

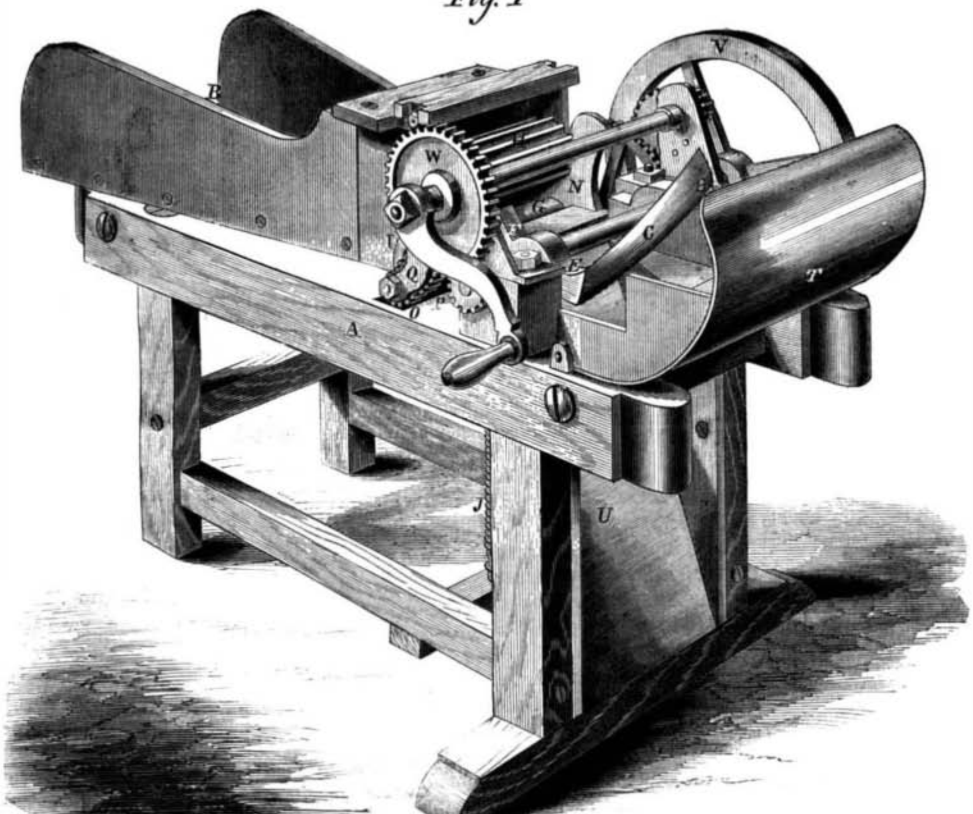


Fig. 2

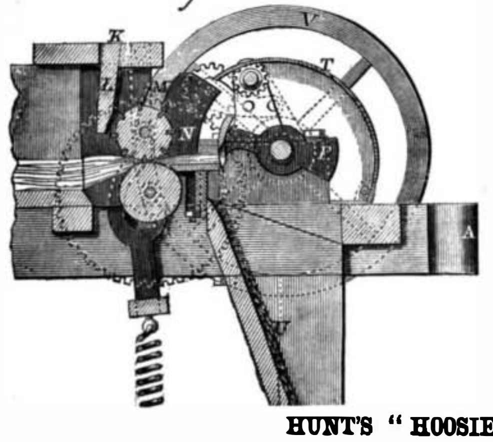
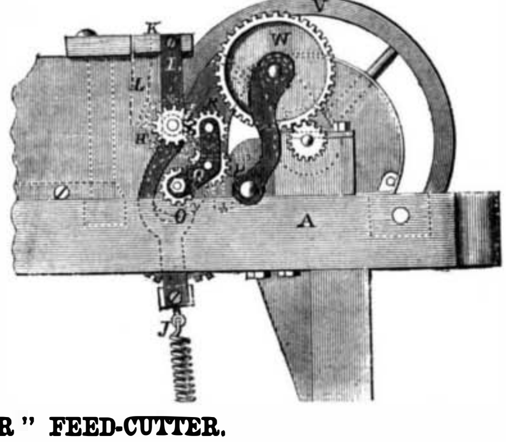


Fig. 3.



HUNT'S "HOOSIER" FEED-CUTTER.

This machine will be found a most useful one to farmers of every class. The arrangement to prevent the knife from being damaged is a very good one; this part of the machine is more costly than any other single detail, and those farmers who live at a distance from the centers of trade find it difficult to get good cutter blades made by ordinary blacksmiths, in the event of accident to the one furnished with the machine. All reasonable chance of injury to this cutter is avoided by the arrangement previously spoken of.

This machine is the invention of F. B. Hunt, of Richmond, Ind., and a patent was granted on the 5th of January, 1864, through the Scientific American Patent Agency. Foreign patents are also being secured by the inventor through the Scientific American Patent Agency. For further information address the patentee as above.

POWER FROM BELTING.

In most of our cities and manufacturing villages steam power is rented extensively for driving machines. Owners of many large buildings put in powerful steam engines, hire out different rooms to small manufacturers, and supply the power from the engine by belting to drive the machines in the different rooms. The custom is to rent so much horse-power, and this is or ought to be measured by the width of belt and its velocity. In justice to those who rent and hire steam power in this manner, there should be a fixed standard of a horse-power communicated by belting; and yet we know there have been and still are differences of opinion upon this subject. On page 392, Vol. IX. (new series) of the SCIENTIFIC AMERICAN, we published a rule for calculating the power of belting, and also presented a unit for a horse-power, which is 800 feet velocity per minute for a 1-inch belt, or 400 feet for a 2-inch belt and so on. A manufacturer in this city, who hires his steam power, was told by the maker of a grinding mill which he runs, that it would require five horse-powers to drive it; and according to the above rule this was exactly the amount of power of the belt which he hires. He was, however, charged rent for six horse-powers, and the landlord asserted that this amount was supplied, but furnished no evidence to prove it. There are machines specially designed for testing the power conveyed by shafting, but what is wanted is a reliable standard for the horse-power of belting. The person who hires should not pay for more power than he receives; and the one who rents the power should receive neither less nor more than the price for what he supplies. As there are differences of opinion as to the horse-power of a belt, we suggest that those who supply power by belting ought to publish their rules and the standard which they have set up, in order that this standard may be examined and tested, and all differences of opinion upon the subject settled.

DON'T strike finished work with a hammer, take a piece of hard wood instead.