THE MACKAY GUN.

A good deal of attention has been attracted in England to a gun invented by Mr. Mackay, in which the projectile was not to have any projections fitting into the rifle grooves of the gun, the rotary motion being imparted, it was claimed, to the shot by the force of the gases rushing in a spiral course around it through the windage. It has been stated that the gun has proved exceedingly efficient in experiments against iron targets. The *Mechanics' Magazine* publishes a communication in relation to the gun, so intelligent and sensible that we make room for the following extracts:—

"It is a well-known fact constantly referred to in the reports of gunnery experiments, that, whilst the average initial velocity of round shot fired from the old smooth-bore is 6,000 feet per second, that of projectiles from the improved (?) and costly rifled cannon of modern invention is 1,200 feet per second. Squaring these quantities the respective forces of the two descriptions of guns are represented by the number 256—144, or nearly 2 to 1 in favor of the old service gun. This enormous disparity of force is in some measure due to the heavier charges used with smooth bores, but that results from the fact that no rifled cannon in the service can be consecutively fired with safety with a charge exceeding $\frac{1}{6}$th the weight of the projectile; it is frequently only $\frac{1}{8}$th or $\frac{1}{10}$th, whilst the ordinary service charge of smooth-bores is $\frac{1}{4}$th, and in the case of the strongest class of these guns it may be $\frac{1}{3}$. Thus a smooth-bore cast-iron gun, which costs about £100, produces greater initial force, and consequently is a more destructive and efficient weapon, than a built-up wrought-iron or steel gun, which costs about £300. Accuracy at long range is another question, but whatever the range, the force-shot is subordinate to the initial velocity.

"In this comparison service ordnance are alone referred to; no account is taken of monster guns, which are in their infancy, and whose life does not promise a long duration.

"It is inconceivable that the scientific artillerists of the day should be regardless of the most important constituent of a perfect rifled gun. They seem with one accord to have made up their minds that 1,200 to 1,300 feet per second is the highest velocity which can be got out of a rifled gun. Captain Blakely, perhaps the most practical manufacturer of them all, declared at a public discussion on rifled artillery, that in his opinion 'the mode of rifling was of no more value than the paint on the gun.' I suppose he meant they were all equally bad. This may, however, be taken as the expression of the idea on that subject of the whole body of artillerists. It probably is founded on the uniformity of the results obtained from plans hitherto tried. But no account seems to have been taken of the circumstance that the systems adopted are all of a forcing character—some by sudden compression or extension of soft metal, others by mechanical fit—but all, to use the words of Mr. Anderson, the Superintendent of the Royal Arsenal, 'putting heavy strain on opposite sides of the gun, and tending to split the iron asunder.'

"Mr. Mackay, it appears, has devoted his attention to this subject. He has produced a gun with which rotation of the projectile is obtained without causing, it is alleged, any strain on the barrel beyond that caused by the explosion of the charge. He fires a smooth cylindrical projectile from a gun with grooves in the bore. These grooves are very shallow. In the trial-gun, of which the caliber is 8 inches, there are 12 grooves, 1-40th of an inch in depth, and 12 bands, each 1 inch wide. The twist or angle of spiral rifling is very quick, making 2½ turns in the length of the bore, which is about 10 feet. The cylindrical shot weighs 160 lbs., and has been fired with charges of 35 and 30 lbs. Under these conditions, according to Mr. Mackay's theory, rotation of the projectile is produced by the action of the gas passing through the spiral grooves laying hold of the shot and causing it to spin as it passes out of the bore. Many engineers are of opinion that the rotation is due solely to the friction of the shot on the edges of the grooves. In that opinion I concur. When a body is in motion at a high velocity, rubbing against the surface of another body which is stationary, the slightest irregularity of the surface of either will alter the line of motion of the former, and if the obstructions, however trivial, are in one direction, the moving body will take their direction. This explanation appears to be more reasonable than the gas theory.

"Be that as it may, we have rotation produced by a method, which, contrary to all other tried systems, it may be assumed neither puts a strain on opposite sides of the gun, nor obstructs the passage of the projectile out of the bore. except to the extent that the friction before referred to may produce those effects.

"This plan is represented as a new phase in gunnery of which Mr. Mackay is the inventor. That statement might be questioned, but this is not the place for doing so. With reference to the public service, the essential point is the character of the results obtained in the experiments at Crosby Sands, near Liverpool. It is claimed as a remarkable exploit that the projectile penetrated and crushed through an armor-plated target with extraordinary facility. To form a correct judgment on the performance of the gun, we must take all the circumstances into account, and compare them with those of other experiments. If this be done fairly, it will be apparent that the gun could not be expected to do less than it did.

"The projectiles, weighing 160 lbs., were of hard and tough steel highly polished, the charges of 35 or 30 lbs. were in the proportion of one-fourth to one-fifth of the weight of the shot. The windage was extremely small, amounting to about 1 per cent of the area of the cross-section of the shot, whereas the ordinary windage of a smooth-bore gun is 5 per cent, so that the explosive force of the gas was immensely increased. Experiment has proved that with a given proportionate weight of shot and charges fired from a smooth-bore the initial velocity, which, with windage of 5 per cent, was 1,500, was, by reducing the windage to 1 per cent, increased to 2,000 feet per second.

"On the other hand, the target fired at was of the *Minotaur* type (the *Agincourt* is a sister ship), consisting of 5½-inch plates on 9 inches of teak, and the *Warrior* skin and frames—a description of armor-plating which miserably failed at Shoeburyness, having been demolished by a few rounds of cast-iron shot, which failed to penetrate the *Warrior* target.

"If we look at other target trials, we find that steel projectiles of 150 lbs. weight, fired with charges of 30 and 35 lbs. of powder, and more windage than that allowed by Mr. Mackay, played the same havoc as that produced by his gun with armor-plating much stronger than that of the *Agincourt*, which is allowed, by the Government authorities, to be the weakest of all the systems tested.

"The experiments in question were of the same objectionable character as those by which the public and the authorities have been often misled. A startling result is obtained. For the moment nothing but that result is seen or considered. The performance of the Armstrong 110-pounder was for a long time the theme of the most extravagant encomiums, but they lasted only so long as the gun encountered a resistance inadequate to its force.

"So it may prove with Mr. Mackay's gun. Its apparent success may be attributable to the combination of firing a heavy projectile of hard steel, with a heavy charge and little windage, at a short range against a target offering little resistance.

"The initial velocity of one shot was stated to be 1,640 feet. But regarding the action of the gun as that of a smooth-bore, which is the right way, since there was no rifling on the shot, and taking into account the charge and the small windage, the velocity ought to have been much greater. As that was not the case, one is led to infer that the friction of the shot against the edges of the grooves in rotating in the gun, absorbed a large portion of the explosive force. As to range and accuracy at long ranges, nothing is yet proved. Whether the spin of the shot is of that steady and uniform character which will be maintained at long distances, and can be relied upon for precision of aim, is not known. These points have yet to be tested, and will no doubt soon be cleared up, as the gun, it is understood, is to be transferred to Shoeburyness, where it will undergo a series of experiments under the supervision of the Ordnance Select Committee."

THE yield of thirty-seven silver mines in Nevada Territory is estimated at $1,000,000 per month, of which the Gould & Curry mine furnishes $450,000.

Seal Fishing off Newfoundland.

A fleet of three or four hundred vessels, chiefly brigs, goes out every spring about the first of March from St. Johns, N. F., to engage in the business of catching seals. The field of operations is the floating ice that comes down from the North at that season. The men advance upon the fields of ice in couples—so that one may assist the other in case of accident. They kept to the leeward of the ship, else they might lose her, as indeed sometimes happens in the dense fogs. About the 7th of March the young seals are found about the size of cats, mewing on the ice. They are not yet fit to be taken, but by lying in the sun and sucking the ice until about the middle of March they gain three inches of fat. Then commences the slaughter. The men walk up to the white coats, as the young seals are then called, and knock them over, by striking them on the forehead with a long pole, stick them with a knife, cut them down the breast, and the carcass rolls out, leaving the skin and fat which are all the seal-catcher is after, the carcass being left on the ice. Usually in about the last week in March the seals begin to dip, they take to the water, and are then only to be captured by shooting from the boats.

Old seals are invulnerable unless shot in the forehead, and nature has provided them with a means of defense even here, in the shape of a "hood," which they drop on occasions—hence their name, "old hoods." So the season of catching them is but about three weeks in duration. Then men often go five or six miles from the ship on the floating ice. They get one-half they catch, sometimes making a good trip, at other times getting nothing. One spring a crew that were out three weeks and three days, shared $135 apiece. A brig of 150 tuns will take as a crew about forty men, who are provided by the merchant fitting out the vessel with a full supply of provisions, and all things necessary for the prosecution of the voyage, in return for which each man pays a small sum, called "berth money;" and should the voyage prove unfortunate, the merchant has to stand the loss of the entire outfit. It is a dangerous occupation, for the brigs are liable to be crushed in the ice, though they are strongly built. The fat of the seal, after being brought into port, is cut into small pieces, placed in large vats, and left to drain off to oil, which is an article of commerce. The skins are used for various purposes.

Aerated Lemonade.

Cooley states that the best lemonade of the London makers is prepared by putting 1½ fl. oz. of rich lemon sirup into each bottle, which is then filled up with aerated water at the bottling machine. A good lemon sirup for this purpose may be made by the Ph. L. process, omitting the spirit, and aromatizing by adding 30 to 40 drops of essence of lemon, or 1 fl. oz. of a strong tincture of fresh lemon-peel. We find the following form in our note-book, but as we have not tried it, we cannot say what sort of lemonade it furnishes:—Take of tartaric acid 1 oz.; essence of lemon, 20 drops; simple sirup, 1 gallon. Rub the essence with a little sugar, and afterwards with a portion of the sirup; and having dissolved the acid in a small quantity of water, mix the whole thoroughly together. One pint of this is sufficient for two gallons of carbonated water.

Possibly some of our practical readers will supply us with a good working formula for aerated summer drinks.

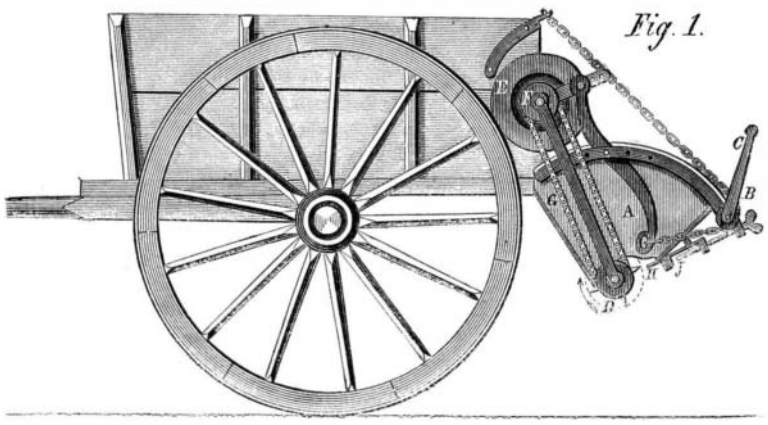
ENGLISH PEALS OF BELLS.—A correspondent of the *Builder* says:—"We have now in London and different parts of the United Kingdom about 14 peals of twelve bells; 50 peals of ten bells; 600 peals of eight bells; 700 peals of six bells; and about 400 peals of five bells; and a great number from one bell to a chime of four bells; and all these peals of five to peals of twelve bells cost each from £300 to upwards of £2,500. So you see what a merry ringing island England is; and a melodious peal of bells is perhaps not less captivating than the finest toned instrument ever yet invented."

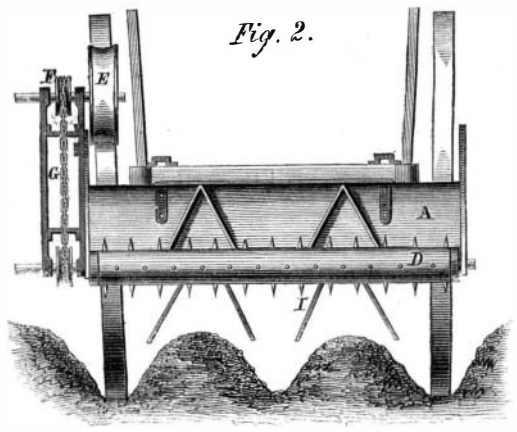
ENGLAND imported a hundred million eggs in the last four months, against eighty million in the same time last year. In the single month of April she imported 42,650,000 eggs, while the number in April, 1863, was 28,540,000 only.

Improved Manure-spreader.

This useful invention is well adapted to the wants of farmers, and is so constructed as to answer the purposes of a convenient manure-spreader, and yet be afforded at a low price, for it can be attached to any wagon or cart generally used about a farm. This feature alone will no doubt recommend it to all farmers.

The details are not complicated; they consist merely of a tail-board or hopper, A, hinged to the back end of the cart, and provided with a winch, B, and an arm, C; by the aid of these fixtures the contents of the cart can be distributed equally and evenly, for as the manure is drawn out the tail-board is lowered, so that the contents are fed regularly to the revolving toothed drum, D. This latter appurtenance is driven by a friction wheel, E, which runs on the tire of the cart-wheel and communicates motion to the picker, D, by the rag wheels, F, and chain, G. Thus, it will be seen that as the cart advances the toothed picker, D, draws the manure down to an opening, H, between the tail-board and the cart-tail, from whence it falls on to the chutes, I (see Fig. 2), which distribute it in the trenches or about the hills as may be desired. The opening is graduated by the movable slide, J, and there is also a toothed plate, or its equivalent, placed near the picker, D, so that the teeth will be cleaned each time and not become clogged from any substance that may attach to them. A handle may be applied to the squared ends of the shafts the rag wheels, F, are on, and the manure spread by hand on any part of the field that requires more than others. In the engraving the machine is shown attached to an ordinary coal cart. This machine was patented on May 17, 1864, by Philip Eley, through the Scientific American Patent Agency; and further information may be had by addressing him, care of E. J. Richmond, No. 508 Pearl street, New York.



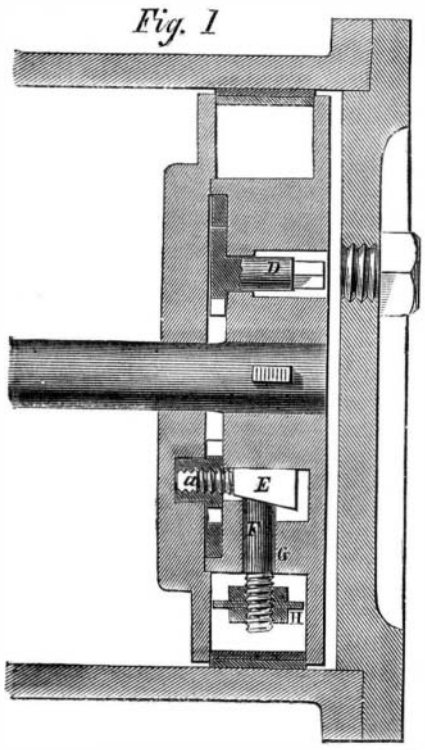


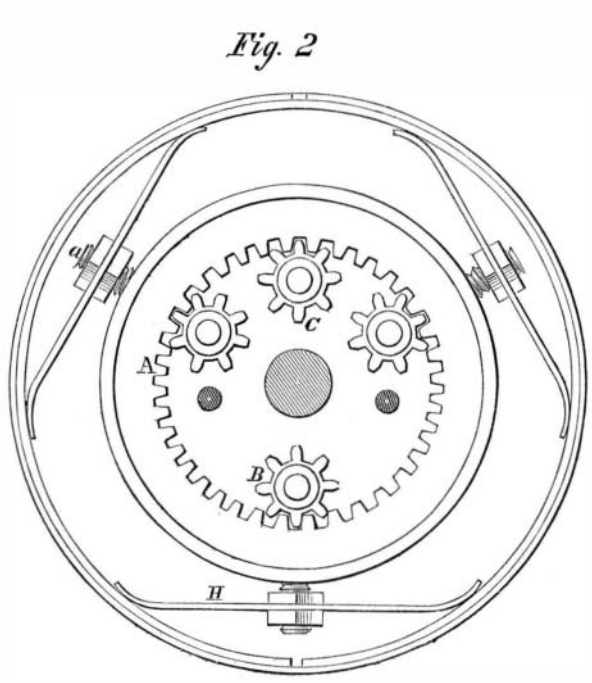
ELEY'S MANURE-SPREADER.

Improved Piston Packing.

To pack a steam piston properly, requires a great deal of time and attention, and unless the person attempting the operation understands it thoroughly he is apt to make a bad job of it. In order that pistons may be packed quickly and well very many devices have been invented by the aid of which the duty may be performed by simply turning a screw, or its equivalent. In the accompanying engraving a method of packing the piston is shown which is as simple and efficient as any of its class that we have ever seen. When it is known that the piston leaks, the packing is easily and quickly tightened (without removing the cylinder-head or but one bolt) equally from the center all round the cylinder, so that it is impossible for even the most inexperienced person to do the work improperly.

The arrangement of the several parts is as follows: The piston has a toothed ring, A, working in a recess between the follower and the piston, and this ring gears with the lower flanges of the toothed nuts, B. These nuts also work in recesses between the follower and piston, and when the ring, A, is turned by the spur-wheel, C, the nuts are also turned. By this means the bolts, *a*, in the nuts, are forced in or out according with the direction the handle, D, is turned. On the lower end of the bolts just mentioned there is a wedge-shaped head, E, which bears on another bolt, F, working easily in a hole, G; the bolt is loose where it touches the wedge, and confined to the spring, H, by nuts so that it may be lengthened or shortened as the packing wears. It is easy to see that as the handle, D, is turned by a socket wrench the toothed ring will revolve and draw the bolts, *a*, up, this act causes the wedge, E, to strike against the bolt, F, and thus push the springs out. An index on the outside of the cylinder-head shows the extent to which the packing has been tightened. These details are very simple. The nuts and rack may be cast with the teeth on, and the several parts are easily made by any ordinary workman. They are readily kept clean and free from gum, and will doubtless give good satisfaction. This invention was patented through the Scientific American Patent Agency, on June 7, 1864, by J. Randolph Abbe, of Providence, R. I. State and county rights are for sale; for further information address the inventor as above.





ABBE'S PISTON PACKING.

Coffee, a Preservative of Milk.

M. Berthond states that exactly a year ago a chemist, a friend of his, in his presence placed three vessels on his window-sill, two containing pure milk just drawn before their eyes, and the third having equal parts of the same milk and black coffee. The vessels were covered with little boards to prevent the dust from falling upon the liquids, and before the end of the day the pure milk had turned, while the mixture of milk and coffee remained in the same state. At the end of the year, that is a few days ago, the vessels were again examined, when those which had contained pure milk were found covered with all kinds of moldy vegetation, without a trace of milk or caseous substance in them, while the milk and coffee not only presented no change of appearance, but had exactly the same taste it had when fresh.

Scientific.

Among the passengers by the *Smyrniote* were Messrs. Wm. T. Brigham and Horace Mann, who have been sent out by the Lawrence Scientific School of Harvard University, and by the Smithsonian Institute of Washington, for the purpose of making a scientific exploration of these islands. Their plan is to collect specimens of all the bugs and insects, land and sea shells, fishes, birds, etc. These specimens are designed to enrich the museums of those institutions. In addition to this service, for which they specially came out, they are prepared to undertake a geological survey of the islands, should the Hawaiian Government authorize one to be made. Now, while qualified persons are on the ground, ready to engage in such a work, would it not be well for the Government to secure their services? The oft-mooted question whether gold exists in Koolau can now be definitely settled, and the investigation might result in finding some other mineral ore, or, what would be still more valuable and not at all improbable, in finding coal deposits. The discovery of coal on these islands would enhance the value of real estate at least 100 per cent, and give great impetus to every branch of business.—*Commercial Advertiser, Honolulu, Sandwich Islands, May* 14, 1864.

To Keep Honey.—M. Sands, Orange county, N. Y., directs to heat strained honey to the boiling point, and store it in covered jars, where it will keep without candying. To prevent danger of burning, set the vessel in which it is to be heated into another containing water.