

BREECH-LOADING FIREARMS.

We publish the third and last series of illustrations of breech-loading fire arms, which we select from the pages of E. H. Knight's "American Mechanical Dictionary."* It shows three American and one Swiss inventions, the latter being a bolt needle gun.

U U' are two positions of the Remington gun; the left hand figure shows the gun when fired, the right hand ready to load. The breech block, *b*, swings upon a strong pin within a mortise of the stock. *c* is a tumbler which braces the breech piece against recoil at the time of firing, and forms a part of the hammer which strikes a firing pin which passes through the tumbler and is driven against the cap or part of the cartridge case containing the fulminate.

The breech piece, *b*, and tumbler, *c*, are so formed that when the former is closed the rounded upper portion of the tumbler works in a concavity in the back of the breech piece, as shown in Fig. U; and when the hammer is drawn back to half cock or full cock, the rounded back of the breech piece works in a concavity in the front of the tumbler, as shown in Fig. U'. This mode of matching the breech piece and tumbler prevents the possibility of the hammer falling until the breech piece is perfectly closed, and so obviates the possibility of premature explosion of the charge. The extractor, by which the discharged cartridge shells are drawn out from the chamber of the barrel, works between the receiver and the breech piece, and is operated by the opening movement of the latter. The breech piece is opened by a thumb piece. A guard lever, *d*, prevents the trigger being drawn when the breech piece is open.

W W' are two views of the Dodge breech loader, shown as a double barreled breech-loading fowling piece. W is a perspective view, and W' a sectional view. The barrels are hinged to the front end of the stock, so as to tilt upwardly at the rear and nearly balance upon the hinging point, the motions being made by means of the pivoted lever *d*, which laps over the trigger guard and locks the barrels in firing position by engagement of a hook, *c*, with a pin passing through the lug, *g*. The front end of the lever extends beyond the pin on which it turns, and works in a slot in the center of lug, *g*, beneath the barrels, which it serves to elevate and depress. As the barrels are elevated, the front end of the lever strikes against a projection on the stem of the extractor, and retracts the spent cartridge capsule. The frame, *e*, is made of a single piece of metal extending from the front, where the barrels are hinged, to the grip in the rear of the breech; and the locks are fitted in recesses therein, dispensing with separate lock plates. The locks are rebounding, that is, they go forward and fire the cap and return to half cock. The hammers draw back the firing pin when fully cocked. The barrels are adjusted on the frame, and wear is compensated by means of the block, *b*. In use, the left hand need not be moved from where it is in firing; the breech is brought under the right arm, the lever thrown down, a fresh cartridge inserted, the lever returned, the hammer cocked, and the piece is ready to fire.

The gun adopted by the Swiss Federal Government has the magazine and cartridge carrier of the Winchester, with the needle exploder and bolt breech. The large figure is a longitudinal central section; *x* is a perspective view of the bolt, firing pin, and lever detached; *x*¹ is a view of a piece of the breech cylinder; *x*² is a view of the cartridge carrier detached.

The motions are as follows: the lever, *a*, is raised, rotating on the firing pin, *b*, and cocking the latter by the pressure of a cam upon the transverse trigger bar, *c*; the bolt is then drawn back, carrying the firing pin and the hook, which retracts the spent cartridge; the motion eventually rocks the bell crank lever, *d*, and raises the carrier *e*, which brings another cartridge in line with the barrel. The bolt, *h*, is then pushed back, pressing down the carrier, *e*, and driving the cartridge into the barrel; a partial rotation of the bolt, by means of the lever, *a*, locks it firmly by the catching of studs, *f*, on the bolt behind lugs, *g*, on the breech cylinder. The firing pin has remained on the cock since the first motion of the semi-rotation of the bolt, and is now pulled off by the trigger. The combination is known as Vetterlin's.

Y' is the Henry magazine rifle, now known as the Winchester repeating gun. It may be used as a single loader or a repeater. As a repeater the motion of the lever, *a*, withdraws the spent shell of the previous charge, raises the hammer, recharges the gun, and relocks the breech mechanism. The magazine contains seventeen cartridges,

which can be discharged in as many seconds. With single loading, the cartridge is placed in the carrier block, and a single motion puts it in order for firing. The cartridges are placed in the magazine by pressing them through the trap, *b*, on the right hand side of the gun, the magazine being easily filled while the gun swings at the side. They are fed from the magazine into the carrier block by a spiral spring.

Y is a section of the gun immediately after discharge; *c* is an empty shell; *d*, one in the carrier block; *e*, one in the magazine; by the forward motion of the lever, *a*, the links take the position shown in Y', the piston, *g*, is withdrawn, raising the hammer to the full cock, and extracting the empty shell, *c*, which is thrown upward at the same time the carrier block, *h*, with the carriage which it contains is raised by the lever, *i*, placing the cartridge opposite the chamber. This position is seen at Y'. The returning motion of the lever drives the piston forward, leaves the hammer at full cock, forces the cartridge contained in the car-

tact with ether for twenty-four hours, completely loses its activity, and yet regains it as soon as the etherization is stopped.

EXHIBITION NOTES.

PAPER MAKING.—The papermaking machinery is among the most attractive features of the hall, and, to most visitors, also among the most novel. It is exceedingly interesting to them to see the rags come out of the great iron drums, where they are churned and ground, in the form of a milky fluid; to watch the deposit of the snowy pulp, and to see the pulp carried forward on broad belts and between successive rollers, until, growing always thinner and drier, it finally is rolled on a drum as firm, white printing paper. The machinery is said to be the best for the purpose made.

NOVEL TYPE WRITER.—A Russian inventor, M. Alisoff, of St. Petersburg, shows a type writer which, for excellence of mechanical structure, cleanness of impression, and ability to do printing in different characters, leaves the American type writer far behind. It cannot

be made to work nearly as fast, however, as its American rival; and as speed is what most people seek in such a machine, it is doubtful if it will ever come into extensive use. M. Alisoff says that he first turned his attention to making a machine for speed, but finding by observation that few men can think faster than they can write with pen or pencil, he concluded that such an invention was not what was needed, but something that would make as accurate and legible copy as a printed page. In this undertaking he has fully succeeded. His machine writes in the Russian and English characters, makes capitals, small capitals, figures, signs, punctuation points, and all the French accents. As the types are movable, it can be arranged to print Greek, Hebrew, or any other written language. The manner of working it is to move a lever on a dial to the letter desired, and make the impression with the foot upon a pedal. The speed is about that of ordinary writing. M. Alisoff also exhibits an invention for photolithographing music. The staves notes, and signs, printed on thin paper, are kept in small boxes, from which they are taken and pasted upon a large plate of glass, regularity being secured by lines on cardboard at the back of the pane. Thus the composition is built up much more rapidly than could be done with types. A negative is then taken of any size desired—the light passing through the glass—and when transferred to stone the printing is done by the usual process.

CURIOUS SEWING MACHINE CONTRIVANCES.—A French machine has a universal feed, which enables the operator to give the cloth any direction desired, without touching it—a very useful device for embroidering on stamped patterns.

Still more ingenious is an American invention for embroidering set figures automatically. By a curious arrangement under the table, the feed is set so that the machine goes on of itself, reproducing the pattern. About a dozen different simple patterns can be embroidered by changing the apparatus.

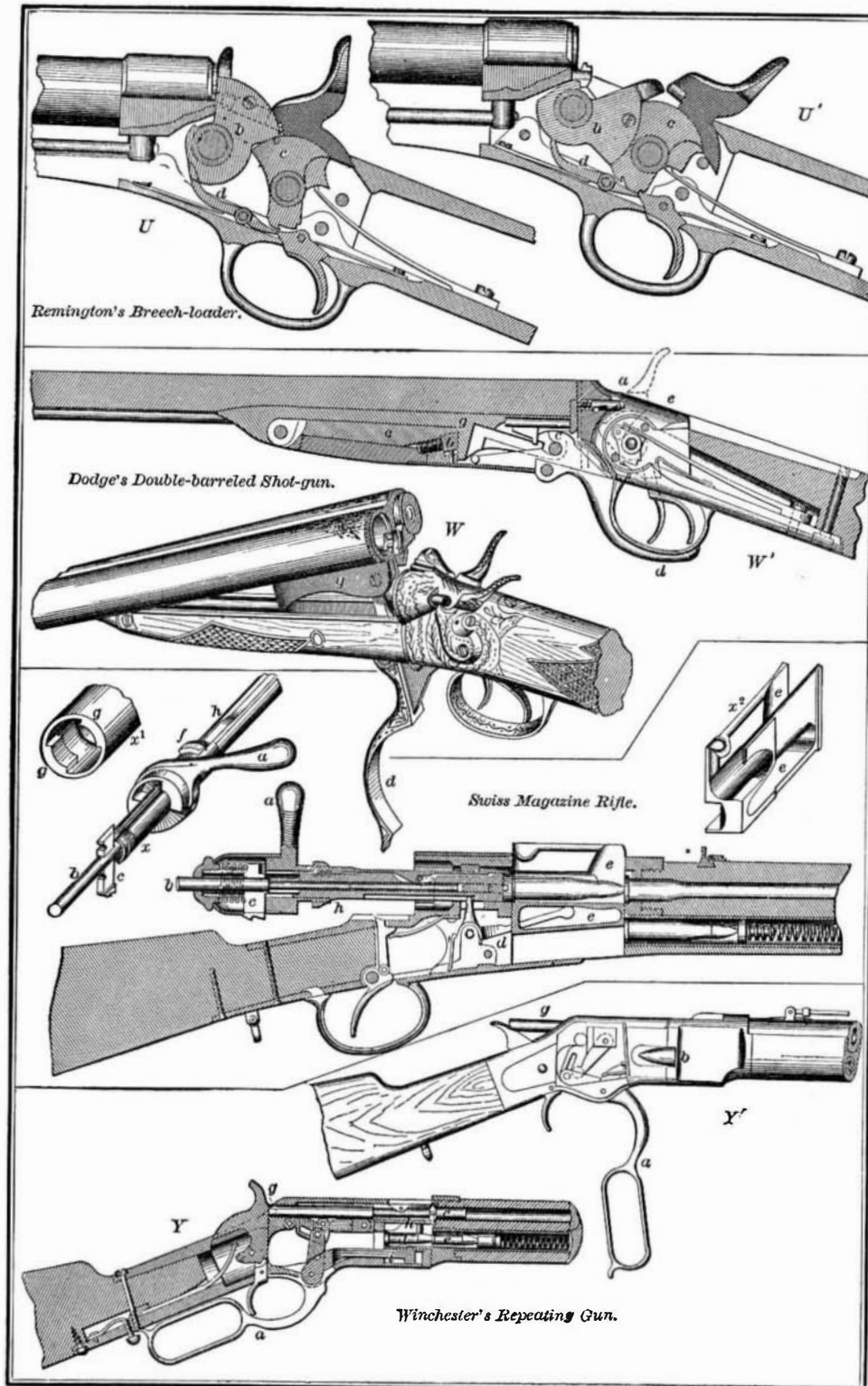
Another noticeable invention is a machine which sews with either one or two needles, as may be desired. It is especially useful for embroidery, as threads of two colors can be used and

double work performed.

Three kinds of machines are shown that sew from the spools, and thus dispense with the troublesome shuttle and bobbin.

The Visit of the French Working Men.

About fifty French mechanics, who have been selected by the Government of France to visit the Centennial, recently arrived in this city. They are to make a critical examination of the Exposition, each man devoting himself to the display presented in his particular branch of art or industry, and, on their return to France, are to prepare reports of the progress exhibited in each separate branch of manufacture. Nearly every class of French industry has its representative in this commission, and the members themselves appear to be intelligent and wide-awake mechanics. There is nothing political in their mission; and in this respect they differ from a body of reputed French artisans who lately visited us, but who deservedly received no special attention, owing to their affiliations with that unfortunate class of men who are always at the head of labor agitations and communistic disturbances. We trust our American working men will give their French brethren a cordial welcome, and spare no pains in affording them every facility for acquiring the knowledge they seek.



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rier block into the chamber, drops the carrier block to receive the following cartridge from the magazine, and places the arm in readiness to be fired.

Plant Anæsthesia.

The curious discovery has recently been made that anæsthesia may take place not only in animals but in plants, and, in brief, in all forms of life. It has been demonstrated that etherisation acts finally on all the tissues of animals and on the central nervous system. Hence, if plants have tissues, the anæsthetic should equally act on them. This substantially appears to be the case; and every vital act, whether occurring in animal or vegetable, may be anæsthetised. In plants, M. Claude Bernard, to whom is due the credit of the discovery, has found that germination ceases under the influence of ether. He introduced water cresses, which germinate from day to day, into two precisely similar tubes. In one tube he placed a little ether. The plant therein on the following day was found not to have germinated, as the other had; but after being removed from the anæsthetic, the first went on and germinated in a natural manner. The plant had literally been put to sleep.

The same is true of ferments; for beer yeast, after con-

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