THE PITCHER AUTOMATIC REPEATING RIFLE.

Since the advent of the Spencer and Henry rifles of 1863-64, thousands of inventors have been striving to accomplish some decided and radical improvements thereon, or to do the same thing in a different way, and disappointment has been the result in far the larger number of cases. Rapidity of fire for a limited number of shots, combined with accuracy, are at this day the principal elements worthy of any considerable attention with a view to improved fire arms construction. The first Henry rifle would fire as rapidly and accurately as the repeating rifle of to-day, and to increase the powder charge and facilitate the manner of recharging the gun have been the most considerable improvements since. In the piston recoil system, of which Dr. Pitcher is the inventor, and which forms the subject of the accompanying illustrations, the degree of efficiency of the gun is practically only limited to the ability of the shooter to aim, while no considerable expertness in the manipulation of the gun is required.

This result is obtained by the application to a barrel and lock mechanism of a cylinder, *a*, as shown in Fig. 1, in which is a piston, *c*, and in front of which is a spiral spring, *m*. A small vent or opening, *e*, extends from the interior of the barrel to the interior of the cylinder, *a*, through which a small portion of gas passes at each discharge. The energy of recoil is stored in the spring, *m*, at the instant of discharge and operates upon the lock immediately as the explosive force leaves the barrel. It will thus be seen that it is only necessary to place the cartridges in the magazine and load the gun for the first charge by hand. When the trigger is pulled, the explosive force operating upon the piston through the vent, *e*, presses it forward against the spring, *m*, carrying forward the drive rod, *g*. The explosive force having left the barrel, the piston, *c*, and drive rod, *g*, are forced back by the spring to their former position. The drive rod, *g*, when at its forward limit engages with a notch in the segment, *i* and thus it will be seen that when the piston is pressed to the rear by the drive spring, *m*, it also forces the segment, *i*, to the rear, unlocking the abutting arm, *y*, through the link, *a'*, and carrying the breech block, *k*, with it. When the utmost rear limit is reached, a knock-off disengages the drive rod and permits the recoil spring to close and lock the gun. The entire operation of extracting the shell, cocking the hammer, replacing a fresh cartridge, and closing the breech is performed automatically, leaving but the one operation of pulling the trigger to repeat at pleasure.

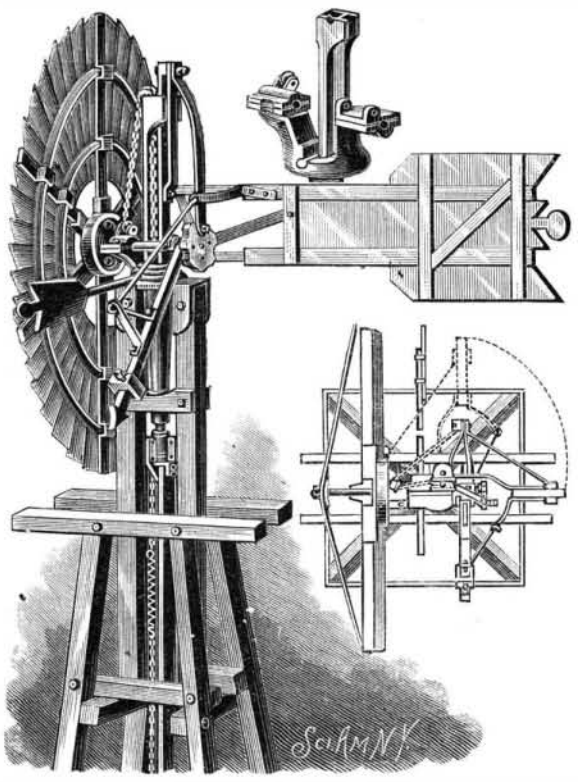
The magazine is on top of the barrel. The cartridges are fed into the receiver through an opening on the right hand side, near the rear upper edge, as shown in Fig. 2, and not on top of the receiver.

A tubular magazine, with spiral spring and follower, is used in the guns constructed, but for military purposes the gun is equally well adapted to use the Lee, Mannlicher, or other form of box magazine. The tilter, which takes the place of carrier or lifter in other guns, is constructed of one piece, and is pivoted in line with the magazine tube. The cartridge remains stationary until the shell is ejected. It is then pressed down and held in alignment with the barrel.

The cartridge is drawn from the barrel by a spring hook extractor and ejected by a positive "stop" ejector. The gun is operated by hand, by a bolt or button upon the right hand side of the frame. But one motion is required to load by hand, viz., to press the bolt to the rear and release the hold, allowing the recoil spring to operate the breech block to place.

The gun is entirely operated by hand, when desirable, by turning a thumb piece or valve upon the side of the frame which closes the vent.

It is claimed that with this gun four shots may be fired per second with a considerable degree of accuracy, no time being lost in reloading and recovering the aim, while the safety blocking is effective and positive. The sights are placed upon the magazine, and firm with the barrel, being higher than ordinary, making it unnecessary to bend the neck to any considerable extent, while at the same time a straighter stock may be used. The facility of charging the gun is somewhat increased by the absence of a spring cover. A slide cover is used instead, and after it is once pushed forward—and it is usually carried and fired in this position—the cartridges may be entered through the opening almost by their own weight.



HAWLEY'S WINDMILL.

The gun as constructed, of which a perspective view is shown in Fig. 3, weighs ten and one-half pounds, is of 0·38 caliber, the cartridge carrying 50 grains powder, 190 grains lead. The barrel is 26 inches long, and the whole is well balanced. The magazine upon top of the barrel and the form of the stock lends to the arm a first impression of oddity which is soon dispelled when one becomes more familiar with its capabilities. The weight of gun for the cartridge used, it is said, may be reduced to nine pounds or less. The last gun constructed has fired more than three thousand shots within six weeks, and is said to be in smoother working condition, after this amount of work, than at first. No spring or part has required to be replaced from breakage since the gun has been in operation. The operative power to extract or replace a cartridge is greater than can be applied by hand, and is universally positive.

For further information relative to this gun, which forms the subject of several patents issued to Dr. Henry A. Pitcher, address the Pitcher Automatic Repeating Fire Arms Co., Neillsville, Wis.

THE PITCHER AUTOMATIC REPEATING RIFLE.

AN IMPROVED WINDMILL.

In the windmill shown, which has been patented by Mr. George D. Hawley, of Urbana, Iowa, the tower consists of two parallel spaced upright masts, connected at the top by a cap having a central opening surrounded by a collar on its upper side, the cap being bolted to the masts, and preventing their heads from warping or splitting. Below the cap, and held horizontally between the uprights, is a cross piece with central opening, forming a bearing plate. The main casting, or turn-table, is of novel form, and is shown in one of the small views. Centrally from the bottom of its disk body portion, a tubular and preferably tapering stem extends downward and is journaled in the cross piece. From the top of the disk body, and at one side of the vertical opening therein, a guide standard extends upwardly, there being a transverse bar at the boreof the guide standard through which the shaft of the governor vane is passed.

The wind wheel is mounted on one end of a shaft having bearings in the turn-table, and on the shaft is a crank disk with a series of apertures at different distances from the center, to receive a detachable wrist pin for connection with the pitman, whereby the plunger may be made to make any one of six different lengths of stroke. The lower end of the plunger is attached to the upper end of the pump piston by a swivel connection. The tail vane has at its inner end, on the side facing the wind wheel, a brake shoe supported by stay rods. The vane is carried into the wind to stop the wheel by a chain secured at one end to the brake shoe or its stay rods, and passing around a pulley held on an arm of the turn-table, thence over another pulley in the upper portion of the standard, and down through a tubular section of the plunger. To carry the vane quickly from one position to another when the chain is slackened, a weighted arm is connected to the vane and pivoted upon the main casting, its pivot bolt being surrounded by a coiled spring, the combined action of the weight and spring greatly accelerating the movement of the vane. In the plan view, partly in section, shown in one of the figures, the positive lines indicate the working position of the vane and the dotted lines its position when carried out of the wind to stop the movement of the wheel. The position and length of the wheel shaft of this windmill minimizes friction and wear, and enables the wheel to be fitted close to the tower, as the shaft runs in two boxes, one at each side of the vertical center, by which also the wheel is enabled to ride steadily, and the side leverage of the mill is lessened when thrown out of gear during a storm. The moment the wheel is thrown out of gear, the brake operates to stop its revolution and hold it quiet until again thrown into gear.

The Speed of a Horse.

While the public is still marveling over Salvator's wonderful performance in running a mile in 1.35½, there are few who have, through comparison and analysis, sought to realize what a terrific burst of speed this is. It is nearly forty miles an hour—a rate averaged by very few of our fastest railway trains. There are 5,280 feet in a mile, so that for every one of these ninety-five seconds—for every beat of a man's pulse—this wonderful horse covered fifty-five and three-tenths feet of ground. The shortest space of time noted by the turfman's watch is a quarter of a second—an interval so brief that the eye can hardly observe, the mind can hardly appreciate it. Yet in every one of those 382 quarters of a second that magnificent creature leaped sixteen and three-tenths feet. Such are the amazing results of careful breeding as exhibited in the American race horse. Is the human race improving in the same ratio? Scarcely.—*Cincinnati Enquirer*.

AT Scranton's rail mill, Scranton, Pa., beginning with cold pig iron, 1,800 men turn out one finished steel rail every sixteen seconds. The men are aided by fuel and the most effective machinery. Each rail is 30 ft. long and weighs 60 to 70 lb. per yard. The pig iron is melted, converted into steel, sent through the various rolls, is sawed into proper lengths, punched and delivered, all in one continuous operation. 350,000 tons of steel rails is the annual product of the establishment.