J. Martin. Sheet 1. 4 Sheets.

Machine Gun.

No 1713. Patented Aug. 3. 1840

Fig. 1.

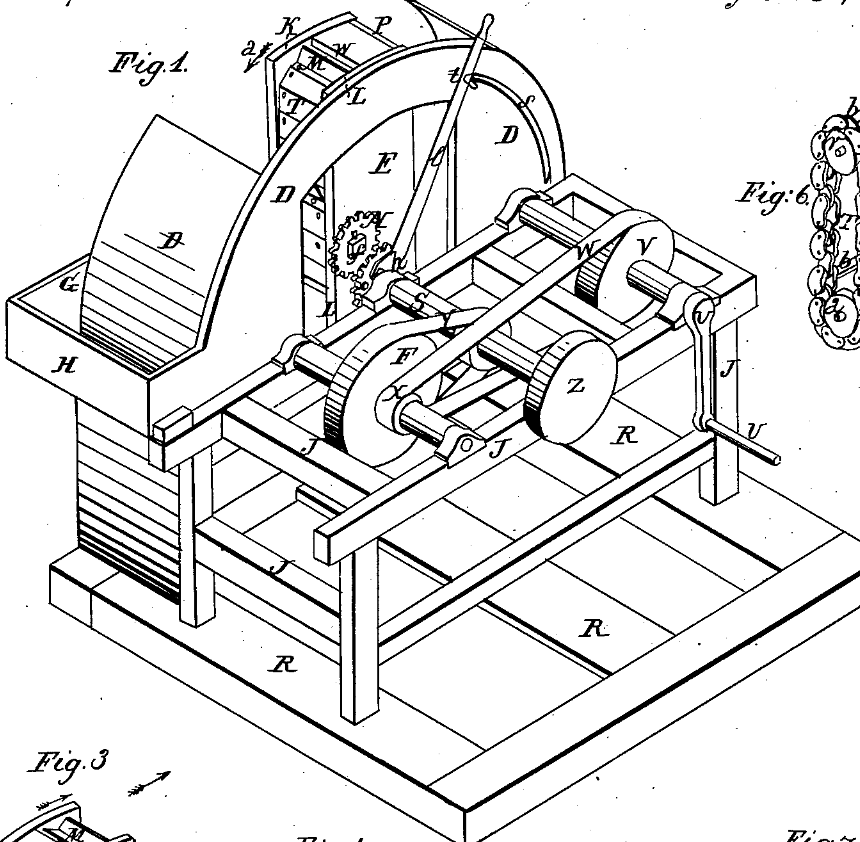

Fig: 6.

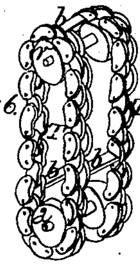

Fig. 3

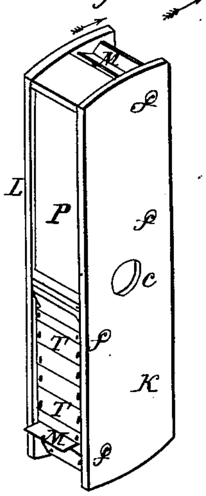

Fig. 4.

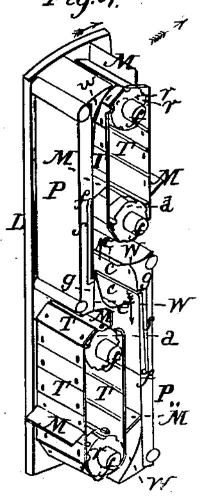

Fig. 5.

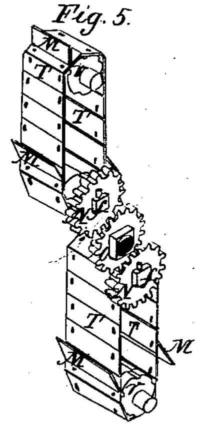

Fig. 7.

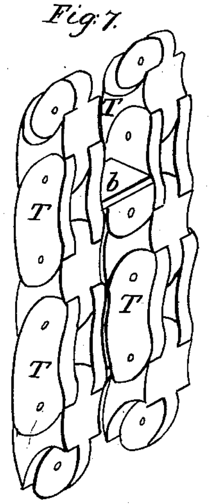

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Fig. 2

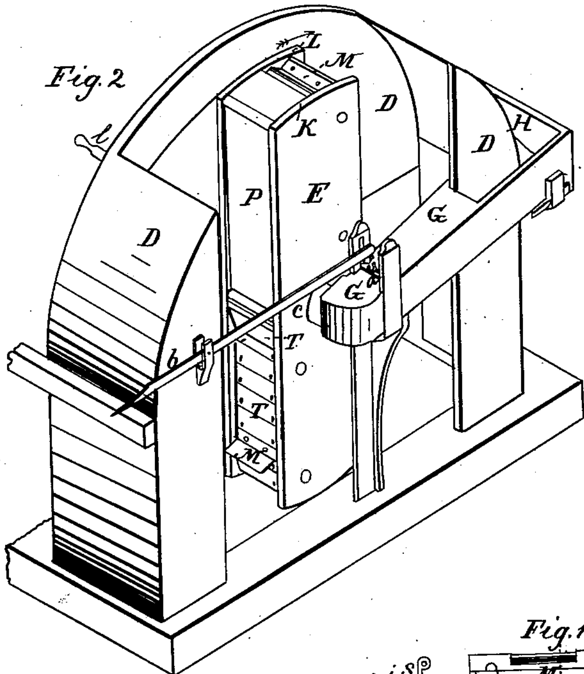


Fig. 12.

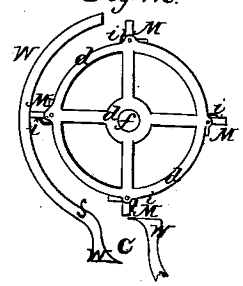


Fig. 11.

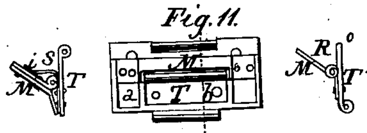


Fig. 9.

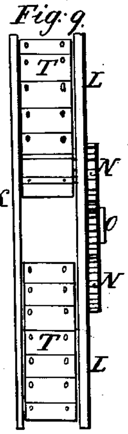


Fig. 10.

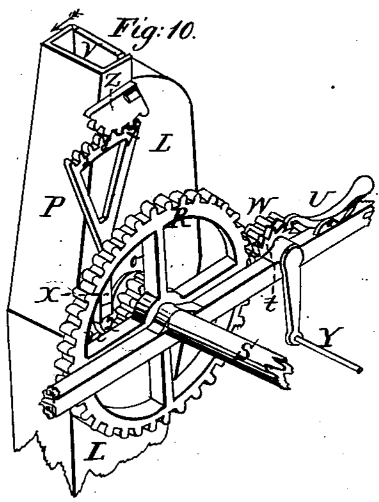
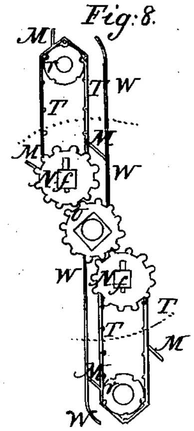


Fig. 8.



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Machine Gun.

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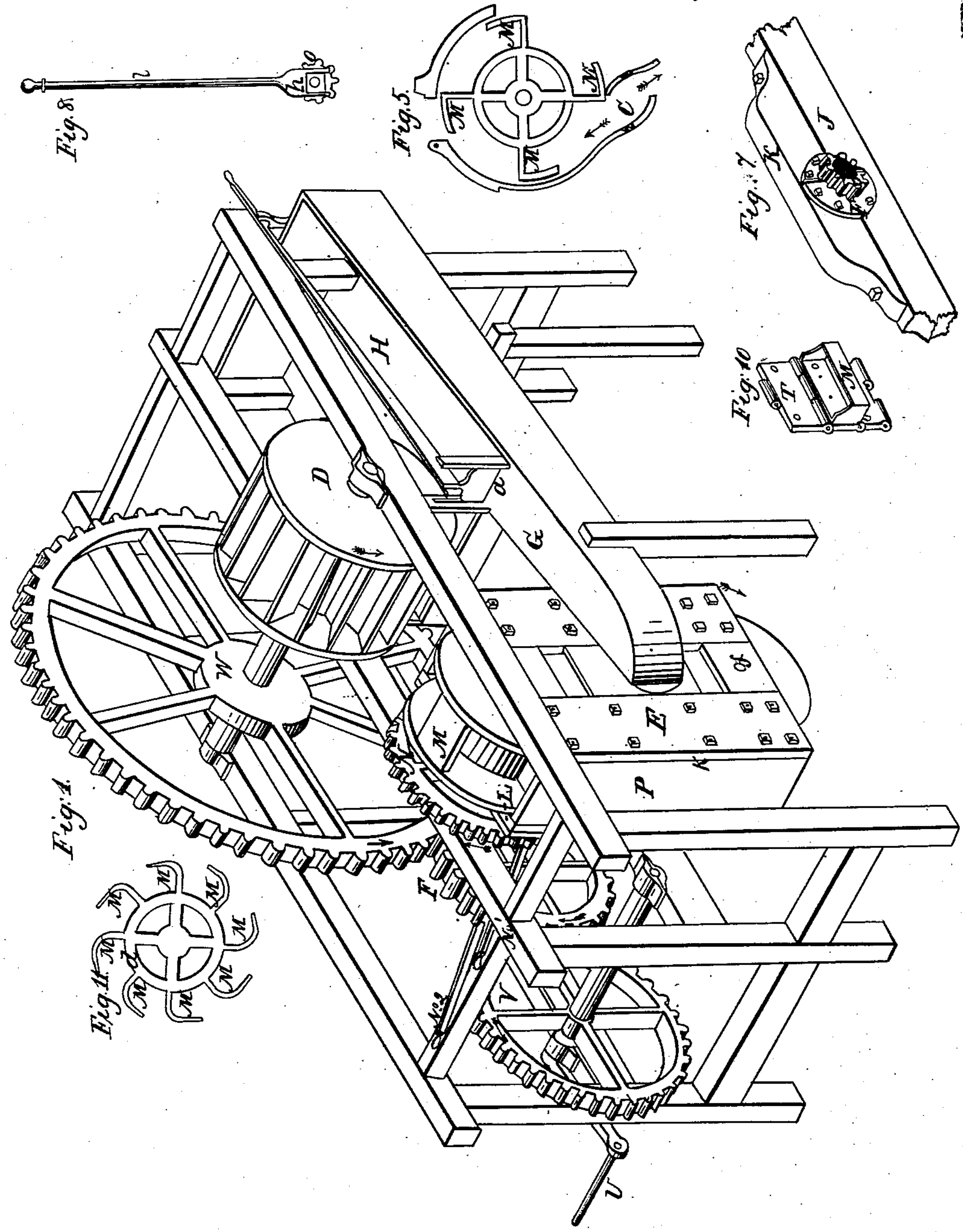

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Fig: 4.

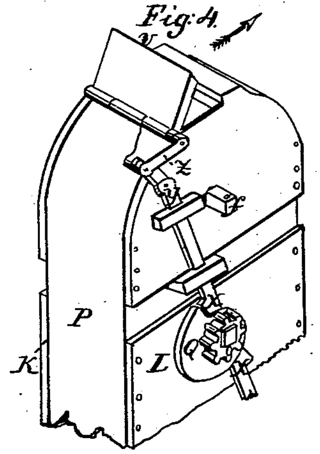


Fig: 6.

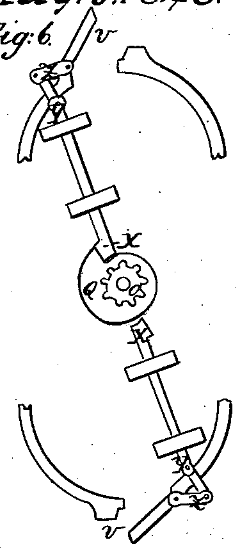


Fig: 9.

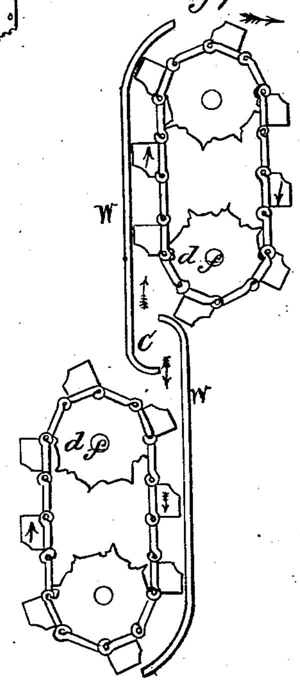


Fig: 3.

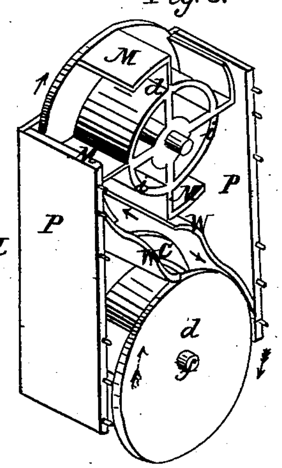
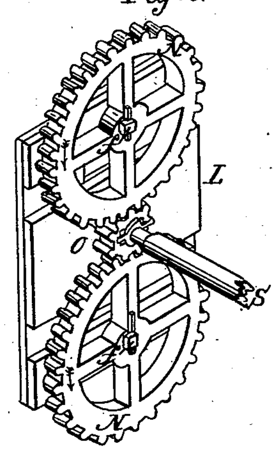


Fig: 2.



UNITED STATES PATENT OFFICE.

JOSEPH MARTIN, OF LOUISVILLE, KENTUCKY.

MACHINE BY WHICH THE CENTRIFUGAL FORCE IS CONTROLLED IN THROWING BALLS AND OTHER BODIES.

Specification forming part of Letters Patent No. **1,713**, dated August 3, 1840.

To all whom it may concern:

Be it known that I, JOSEPH MARTIN, M. D., late of the county of Talbot and State of Maryland, and now of the city of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful machine, which I call the "Central-Power Engine," by means of which the centrifugal principle may be practically applied as a projectile force and as a moving-power for machinery and other useful purposes; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, and of the various modes in which I contemplate the application of the principle, reference being had to the annexed drawings, A and B, making a part of this specification, in which—

Figure 1, Drawing A, is a perspective view of the engine E on a frame; Fig. 2, a perspective view of the front of the same with a part of the frame; Fig. 3, the engine detached, shown in perspective; Fig. 4, the same with the front plate removed; Fig. 5, a perspective back view of the engine without the plates and lever; Fig. 6, a double endless chain in perspective; Fig. 7, a similar view of part of a large chain; Fig. 8, a diagram of the wheel-work and chains; Fig. 9, a side view of the engine in a vertical position without the side plates; Fig. 10, a perspective view of one end of the engine inclosed; Fig. 11, a broad link with a receiving-plate and spring; Fig. 12, a vertical section or diagram of a wheel for receiving and directing shot.

In drawing B, Fig. 1 is a perspective view of one form of the engine E in connection with a water-wheel and other machinery; Fig. 2, a perspective view of the wheel-work enlarged and the back plate; Fig. 3, a front view, in perspective, of the engine enlarged and detached; Fig. 4, a similar view of one end of the engine inclosed; Fig. 5, a vertical section of a part of the same and a power-wheel; Fig. 6, a plan of the cam, rods, and joints that work the valves; Fig. 7, a permanent fixture for the center wheel; Fig. 8, the elevating-lever detached from the engine; Fig. 9, a view of an arrangement of endless chains and buckets on a large scale; Fig. 10, form of the broad links and buckets; Fig. 11, a section of a power-wheel.

The engine, when large, is secured to the end of the main shaft S, Fig. 2, Drawing B, by means of a thick flange or plate, which is either cast with it or riveted to the back plate, L, as shown in the drawings. Through these the square end of the shaft is made to fit with accuracy and fastened on the inside by a strong pin and screw-nut. In smaller engines the flange or plate may be dispensed with; but for all heavy engines the main shaft must be cast with a broad and strong flange of sufficient length, to which the back plate or frame-work, L, made of wrought-iron, is to be firmly riveted or secured by screw-bolts and pins, the bearing or round part for the plumber-block on the frame and for the center wheel being previously turned. The center wheel in such cases must be cast in two parts, either by itself, with a flange for securing it to the frame by screw-bolts, as is shown in Fig. 7, Drawing B, or, when heavy shot are to be projected, each half of the center wheel, O, is to be cast with a half of wheel R, Fig. 10, Drawing A, divided through the centers of two opposite spokes, and the halves of the two wheels are to be firmly fastened together by rivets after being fitted to the turned part of the shaft. In all cases the main shaft must be very strong, and when the flange is not cast with it the round part for the bearing in the plumber-block and for the center wheel, O, Fig. 2, Drawing B, must be turned before it is squared to fit through the back plate, L. In very heavy engines in which water is used the shaft passes through the center opening, C, Fig. 3, Drawing A, and terminates in a gudgeon or bearing. In every instance an engine may be attached to each end of the main shaft and placed at right angles to each other. When one only is used the other end of the shaft must be supplied with a fly-wheel.

The front plate, K, in small engines may be of wood or iron, in one piece, as seen in Figs. 2 and 3, Drawing A, or of several pieces, as in Fig. 1, Drawing B. It is secured by screw-bolts passing through the back plate, K, and the side plates, P P, Fig. 4, Drawing A, or by the projections on the edges of the side plates, P P, Drawing B, Fig. 3, which are designed to receive screw-nuts.

Having given a general view of my invention and described the manner in which the frame-work of the engine is put together and secured to the main shaft, I will now give a full and exact description of the machine or engine in its various forms, and then point out separately and in combination the parts which I claim as my discovery or invention.

In Fig. 1, Drawing A, the boxing D D D is designed only as a protection to engineers and others while the engine is in operation. H is a hopper or reservoir, and G is a part of the supply-tube seen in Fig. 2. The frame J J J J, which sustains the engine E, with the accompanying wheels, bands, and winch, rests upon a horizontal frame, R R R, designed to show that by an ordinary arrangement of a center spindle the engine can be easily turned to any point. O is the center cog-wheel, which in this drawing is of the same size with the wheels N N. It has a round opening at its center, through which the main shaft works. It has also, in this form of engine, a square projection surrounding the opening, as seen in Fig. 5. The lever *l*, with a forked end, *h*, fits upon that square projection, and by means of the opening *s* and thumb-screw *t* it can move the wheel O upon the shaft while the engine is in motion and be secured at any point of the segment *s*. In Fig. 2, Drawing A, the supply-tube G G is shown, terminating in the opening C of the engine, and having a valve or slide, *a*, moved by the lever *b*, for regulating the supply of shot or water.

Fig. 3 shows the engine as a gun detached from the shaft and frame. In Fig. 4 the front plate, K, is removed to show the interior of the engine. T T T T are the endless chains, with their receiving-plates M M M M M M; P P, the side plates, and W W W W the guide-plates. The guide-plates are to be made of iron, and should be very smooth when the engine is to be used as a gun, and must be curved at their inner ends, so as to be closely adapted to the edge of the center opening of the front plate. Their outer ends may be straight, or they may be curved, as seen in the drawing. They may be used with or without the side plates, as circumstances may require, their thickness and breadth depending upon the size of the balls and the number to be thrown at each half-revolution of the engine.

To prevent the engine from receiving a shock when the receiving-plates strike large shot as they move from the center, a portion of each guide-plate is made to act as a spring from the points *g g*, Fig. 4, Drawing A, or a part of the plate works on a hinge with a spiral or some other spring on the outside. The springs must be elastic and move with but little pressure. When the side plates, P P, as in Fig. 4, are of wood, a portion of each is removed to give room for the plate and spring.

The chain or knob wheels *d d r r*, Fig. 4, are made solid, of wood, with iron gudgeons and knobs, or are cast hollow, of iron. They have a double set of knobs and carry the broad endless chains T T T T. They work in the front plate, K, Fig. 3, upon the short gudgeons *f f f f*. At their bearings through the plate L the outer ones, *r r*, have similar gudgeons; but the axles of *d d* project through the plate L and carry the cog-wheels N N, as is shown in Fig. 5, which revolve about the wheel O when it is made stationary and the engine is in motion, their teeth acting upon those of O.

The endless chains, Figs. 4 and 5, are made of common sheet-iron or of boiler-iron, and must be well riveted and have strong bolts to form the hinges or joints. The links must be made of such a size or length and number, in proportion to the relative sizes of the knob or chain wheels and the cog-wheels and the length of the engine, that when all are properly adjusted a particular link will turn up from one or the other end of the engine at every revolution of the engine. In the drawings the relative proportions of the parts mentioned above are such that every fifth link of the fifteen in each chain will be brought to any desired point at every revolution of the engine, the center wheel, O, being fixed by the lever *l*, or by some other means. A plate or bucket for receiving shot or water is therefore riveted to every fifth link.

When a receiving-plate is used, as represented in Drawing A, for receiving shot, it is placed upon a hinge at a greater or less angle with the link, to prevent a shock to the engine when it strikes large shot as they pass through the gun. It is retained in its position by a slight spring, as may be seen by inspecting Fig. 11, in which T is a diagram of a link with a receiving-plate, M, R being a section of it at the dotted line *b*, showing the link T and plate M, and S a section at the dotted line *a*, showing the link T, plate M, and spring *i*. In Figs. 4, 5, and 8, M M M and M M M are the receiving-plates on the endless chains.

If the engine be rapidly revolved by the winch U, Fig. 1, or any other means, and shot or some other heavy body be introduced at the center, their centrifugal force will impel them from the center along the guide-plates to the extremities, from which they will be projected in the direction of the tangent from every point of the circle in which the engine revolves, if the center wheel, O, be permitted to move round with the main shaft. If, however, the center wheel be made stationary by the lever *l*, Fig. 1, and the endless chains, knob-wheels, and cog-wheels be properly adjusted, the plates M M M will receive the shot near the center, and retain them until the engine passes at or near the vertical point, as may be desired, and if they be regularly introduced one or more will be projected at each half-revolution of the engine.

The double endless chain represented in Fig. 6 is designed to receive large single shot between the chains, and control them by the bars *b b b*, which are so arranged in the drawing as to discharge as the plates M M M do. This kind of chain can be made of any required strength by riveting the best hammered iron, as shown in the drawings, the spaces between the middle links receiving the knobs of the double knob or chain wheels d and r. The length of the links and their number will depend upon the length of engine, the size of the knob-wheels, and the proportion between the wheels N N and the center wheel, O. In using this chain it is necessary to have grooves in the plates L and K for it to work in to prevent the bars from being forced from the center of the gun by the balls. The bars may be made flat or square, or may be round with rollers upon them. When the chain is large enough to admit of it plates are to be used working upon pivots or gudgeons at their inner edges, the gudgeons passing through the links of the chain. Each plate is held to its place by a slight spring. When a large shot, in passing through the gun, strikes the edge of one of those plates, the plate moves upon its gudgeons as a hinge, and either permits the shot to pass or recovers its position by the elasticity of the spring and receives it. The further to prevent a concussion when the plates or bars of this chain strike the shot, the springs seen at S S in the guide-plates, Fig. 4, are also used. This form of chain is used for single balls of all sizes, from a rifle-ball to the heaviest cannon-shot, the size and length of the links, the length of the chains, the number of plates or bars, and the relative proportions of the chain-wheels and cog-wheels being determined by circumstances.

For projecting large shot the strongest machinery, made of the best wrought-iron, will be necessary. Fig. 7, Drawing A, is a representation in perspective of links of the largest kind of endless chain designed for that purpose.

The plate b is not drawn with the gudgeons, because they would have confused the figure.

Water, shot, or other bodies projected by the engine are elevated or depressed by turning the center wheel, O, upon the main shaft in the following manner: When the wheel O, Fig. 5, Drawing A, is turned upon the main shaft, it acts upon the wheels N N, and the chain-wheels to which they are attached, and either moves the endless chains T T and receiving-plates M M M, with the shot, outward, and consequently discharges them from each plate before the end of the gun passes the vertical point, which would cause them to be elevated, or retains them by moving the plates toward the center, to be projected horizontally or still farther depressed. The center wheel is moved on the main shaft or secured at pleasure by lever l and its thumb-screw t, Fig. 1, Drawing A, or by the wheel R and its winch and catch Y and U, Fig. 10. The lever l has already been described.

The cog-wheel R, Fig. 10, is cast with the wheel O, either in connection with the cam Q or without it, as may be required. It is operated upon by the pinion and winch W and Y, and is retained in any desired position by means of the ratchet-wheel t and catch U, the catch being held in its place by a spring. As the wheels O and R move together, the winch Y, acting upon R by the pinion W, controls the cog-wheels N N, Fig. 5, the knob or chain wheels d d, and the endless chains with their plates, and consequently will cause shot to be discharged at any required point of the circle in which the engine may revolve. In large engines the requisite number of revolutions in a minute is given before securing the wheels O and R, which then move round with the main shaft and turn the pinion W full upon its axle, the catch being first raised. When sufficient velocity is obtained the pinion is to be coupled with its axle and the wheels R and O turned by the winch until the plates will discharge from the desired point. The catch of the ratchet is then let down and shot may be introduced. Before the engine is revolved the plates and chains and the wheels N N O are to be so arranged that a mark or projecting index on the wheel R will indicate from what point the plates will discharge the shot. This can always be done if care be taken to have as many teeth in each of the wheels N N as the center wheel has, or two, three, four, five, or six times as many, according to circumstances. The index may extend to the height of the circle in which the engine is moving or revolving and carry on its end a plate at right angles to it, along which sight may be taken. In double engines one of them may be thrown out of gear and the other only used. Any competent machinist will understand how to adapt the common coupling-block to the pinion and its axle and to arrange the index. They are left out of the figure to avoid confusion.

The other parts of Fig. 10 are designed to show the operation of the discharging-valve V, worked by the segments Z and a, and the lever X X, operated upon by the cam Q, which is to be attached to the center wheel and moved with it by means of the wheel R or the lever l. This valve, with its accompanying machinery, is only to be used in very long engines, in which the revolutions per minute are few in proportion to the centrifugal velocity. It is opened at the moment required by the centrifugal pressure of the shot discharged upon it by the plates.

The operation of the centrifugal principle as a moving-power by means of the machinery described above is explained in the following manner: If the engine be revolved rapidly with all the wheels, chains, and plates or buckets properly arranged, (the center wheel being fixed,) and a constant supply of common shot be introduced at the center opening, e, Fig. 4, Drawing A, they will be impelled against the plates M M M of the chains T T, Figs. 4 and 5, at both ends of the engine at once, and will cause the cog-wheels N N to act upon the teeth of the center wheel, O, and the axles f f of the chain-wheels d d, on the principle of a lever of the second kind, the teeth of the center wheel being the fulcrum, the resistance at the bearings of the axles *f f* upon the back plate, L, the weight, and the centrifugal force of the shot upon the plate the power, and the amount of centrifugal force will be in proportion to the length of the engine, the number of its revolutions in a minute, the size of the chain-wheels, the relative proportions of the wheels N N and the center wheel, and the whole weight of shot or other substance that may pass through the engine in a minute.

Fig. 12, Drawing A, is a diagram of a projecting central power-wheel, with receiving-plates and springs, and a guide-plate, W W, designed for projecting shot of all sizes. There is one at each end of the engine, and they carry upon their axles the large tooth-wheels N N, Fig. 2, Drawing B, which are four times larger than the center wheel, O, a ball being discharged at every half-revolution of the engine and at the fourth of a revolution of each wheel upon its axle. The number of receiving-plates will always be determined by the relative proportions of the wheels N N and the center wheel. They are made of wrought-iron, with holes through them at their angles for bolts, by which they are attached to the rim of the wheel, and upon which they move as upon hinges, flanges being cast with or riveted to the sides of the rim for that purpose. Each plate is preserved in a position for receiving balls by a slight spring pressing upon each edge, so as not to interfere with the balls. This is the most simple and cheapest form of projecting-engine, and is best calculated to transmit the centrifugal force of the shot, the leverage of that force upon the wheels N N and of those wheels upon the back plate, L, being greatly increased. It can be adapted to balls of all sizes, from a small pistol-ball with an engine twelve inches long to sixty-four-pounders with a nine-foot gun. It is the best form, also, for increasing the width of the gun for the purpose of discharging two or more shot at a time from each receiving-plate.

In Fig. 1, Drawing B, the engine E is represented in connection with a common undershot water-wheel, the force with which the water is projected being made to react upon the engine by means of the tooth-wheels W and F, and the water returning from the reservoir H through the supply-tube G into the engine, to be again employed. An overshot wheel, with a suitable arrangement of wheel-work, may be used in a similar manner, and small shot or other heavy bodies projected. In this form of engine, when large, the center wheel, O, Fig. 2, is cast without the projection for the lever *l* to act upon; but it has a triangular projection on each side of the center opening, with depressions for receiving two bars of a coupling block connected with lever No. 1, Fig. 1, by means of which it is coupled after sufficient velocity has been given to the engine by the winch U and wheel V, or by some other means. Immediately after the center wheel is coupled water is admitted into the engine by raising the valve or flood-gate *a*; and as soon as the water is projected from the engine with some force the wheel F is to be coupled with the main shaft, in the usual manner, by means of the lever No. 2, Drawing 1.

In Fig. 3, Drawing B, the wheels *d d* are power-wheels, used in this form of engine in the place of the endless chains. The upper one has its front board removed to show the drum *i i i* and buckets M M M M. The size of those wheels depends upon the size of the engine and the purposes for which it may be designed. They carry upon their axles the wheels N N, Fig. 2, which may be larger or smaller in proportion than the wheel O, as circumstances may require. In the drawings they are four times larger. The power-wheels may be made entirely of wood, and in ordinary cases they are preferable, the gudgeons only being of iron. They may be cast entire of iron, or the drum may be cast and buckets made of sheet or boiler iron riveted to it. The form of the buckets may vary with the size and design of the engine. In Fig. 3 the form is well calculated to show the action of the water upon the buckets and the leverage of the wheel; but the form in the section of a wheel, Fig. 11, is better calculated to receive and discharge the water. This kind of wheel is designed to be used where there is a natural supply of water. When the water is to be returned into the engine to be again used the number of buckets will depend upon the proportion between the wheels N N and the center wheel, as in Fig. 3.

The power-wheels are boxed up with side boards, and work clear of all the plates without any friction except at their axles. Their breadth will depend on the size and nature of the engine. In the drawings, an eleven-foot machine has a two and a half foot bucket. The water-wheel D is only to be used in very large engines, with very little velocity compared with that of small ones, in which the number of revolutions in a minute may be increased with great advantage. Where there is a supply of water with but little fall, I use a large horizontal engine made in every particular like the one described above, with wheels and buckets similar to those of which a section is given in Fig. 11. Where there is a natural supply of water small in amount, but with considerable fall, the endless chains and buckets with a long engine are preferable. Fig. 9 is a diagram of the interior of an engine of a form well adapted to such a natural supply of water, and also to the use of common small shot in the place of water. The ends of the chain-wells *d r d r* and of the buckets M M M, &c., and the edges of the chains T T and the guide-plates W W W W are plainly shown. They are all so proportioned and arranged as to operate with the wheels N N O, Fig. 2, and discharge from a bucket at or near the top at each half-revolution of the engine. In the forms of engines represented in Figs. 2, 3, and 9 the centrifugal force of the heavy body employed acts upon the center wheel and back plate, L, on the principle explained above, with increased leverage and effect.

In every instance two engines may be made to act together upon the same main shaft, and consequently, whatever be the effect of the machinery described above, it may be doubled by this arrangement, and all the machinery described as having any connection with an engine at one end of the main shaft may have the same connection with a double engine. When the double engine is used as a gun the same winch or crank is made to act upon the two center wheels at the same time, for the purpose of directing the shot, by placing the pinion W, Fig. 10, Drawing A, of each engine in a line with that of the other, and bending their shafts at right angles near the center of the frame, so as to form a crank; and as one ratchet-wheel and catch will be sufficient for both pinions, the shot from both engines may be elevated or depressed by one individual, and by dispensing with the catch in small engines he can propel them with one hand and elevate or depress the shot with the other.

I have in this specification described methods by which my engine may be employed to propel machinery by projecting water or other bodies on common bucket-wheels, for which I do not claim a patent.

I do not claim as my invention the throwing of balls or other bodies by centrifugal force, as that has previously been done; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The method herein described of controlling the centrifugal force of balls and other bodies by means of the combined operation of the chain-wheels *d r d r*, Fig. 4, Drawing A, the endless chains T T T T, with their receiving-plates, the tooth-wheels N N, Fig. 5, Drawing A, the center wheel, O, Figs. 1, 5, and 10, Drawing A, the plate L and shaft S, Fig. 2, Drawing B. (The above claim includes the various modifications of the same principle which have been described in this specification, or any other substantially the same in principle.)

2. The application of the spring-plates S S, Fig. 4, Drawing A, in combination with the receiving-plates M M M, Figs. 5, 11, and 12, Drawing A, and the guide-plates W W W W, Fig. 4, Drawing A, for receiving shot and regulating their discharge, as described above, and the modifications of the same described in this specification.

3. The method described above of regulating the point for the discharge of a ball or other body to be projected by changing the position of the receiving plates or bars relatively to the position of the outer terminations of the guide-plates, for effecting which either of the combinations of machinery acting upon the center wheel, as shown in Figs. 1 and 10, Drawing A, may be used, or any modification of the same which may be substantially the same in principle.

4. The discharging-valves V V, Fig. 10, Drawing A, and Figs. 4 and 6, Drawing B, in combination with the cams Q Q and the rods or levers X X.

JOSEPH MARTIN.

Witnesses:
B. K. MORSELL,
R. R. BURR.