SMITH & WEAVER

Machine Gun.

No. 15,529.

Patented Aug. 12, 1856.

Fig:2.

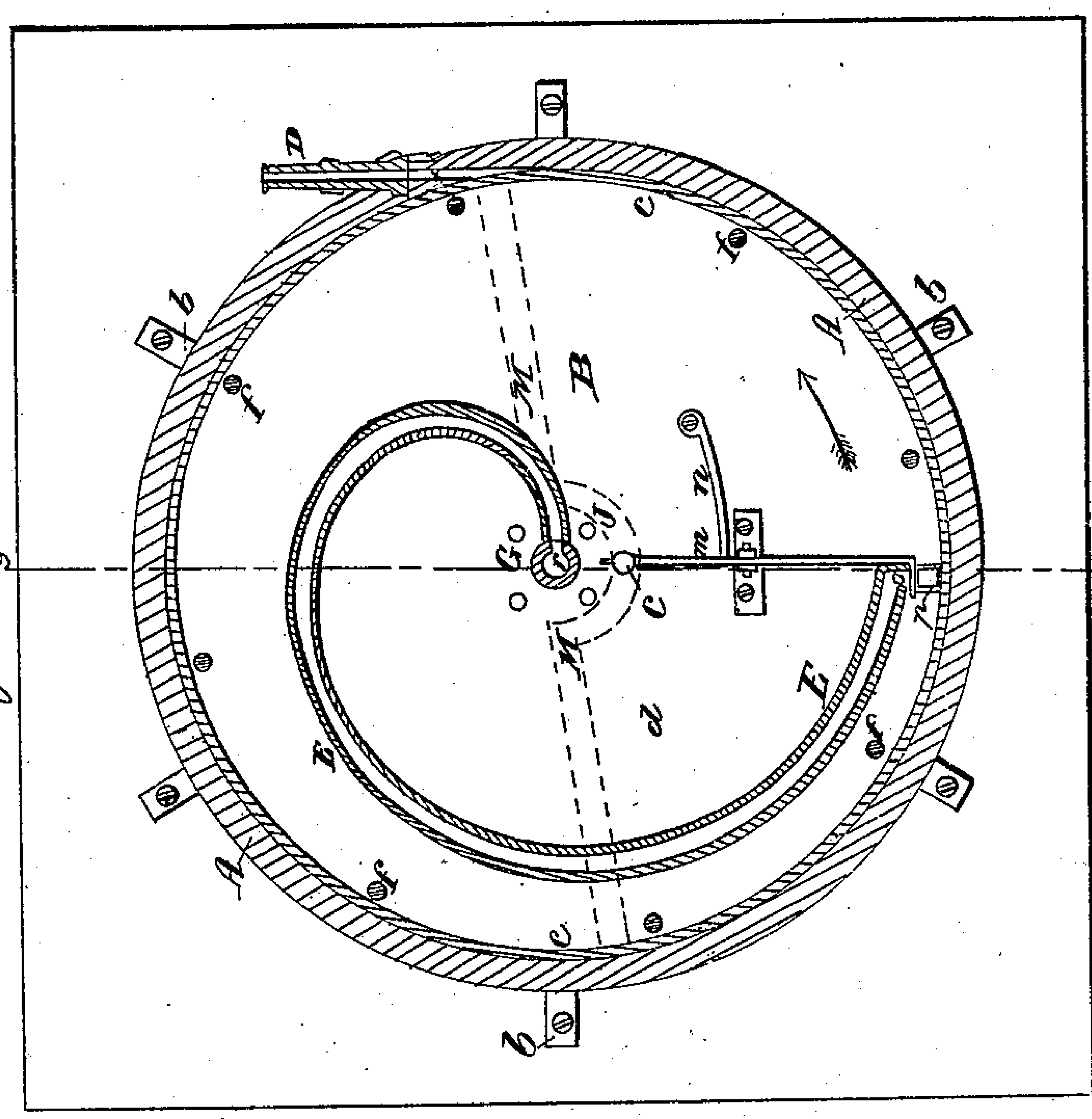


Fig:4.

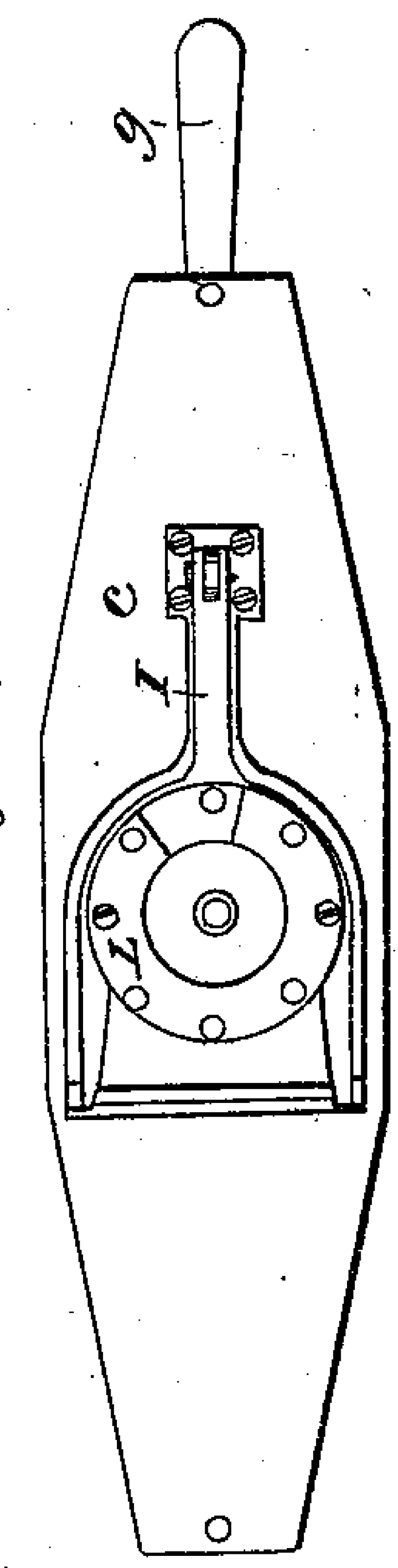


Fig:1.

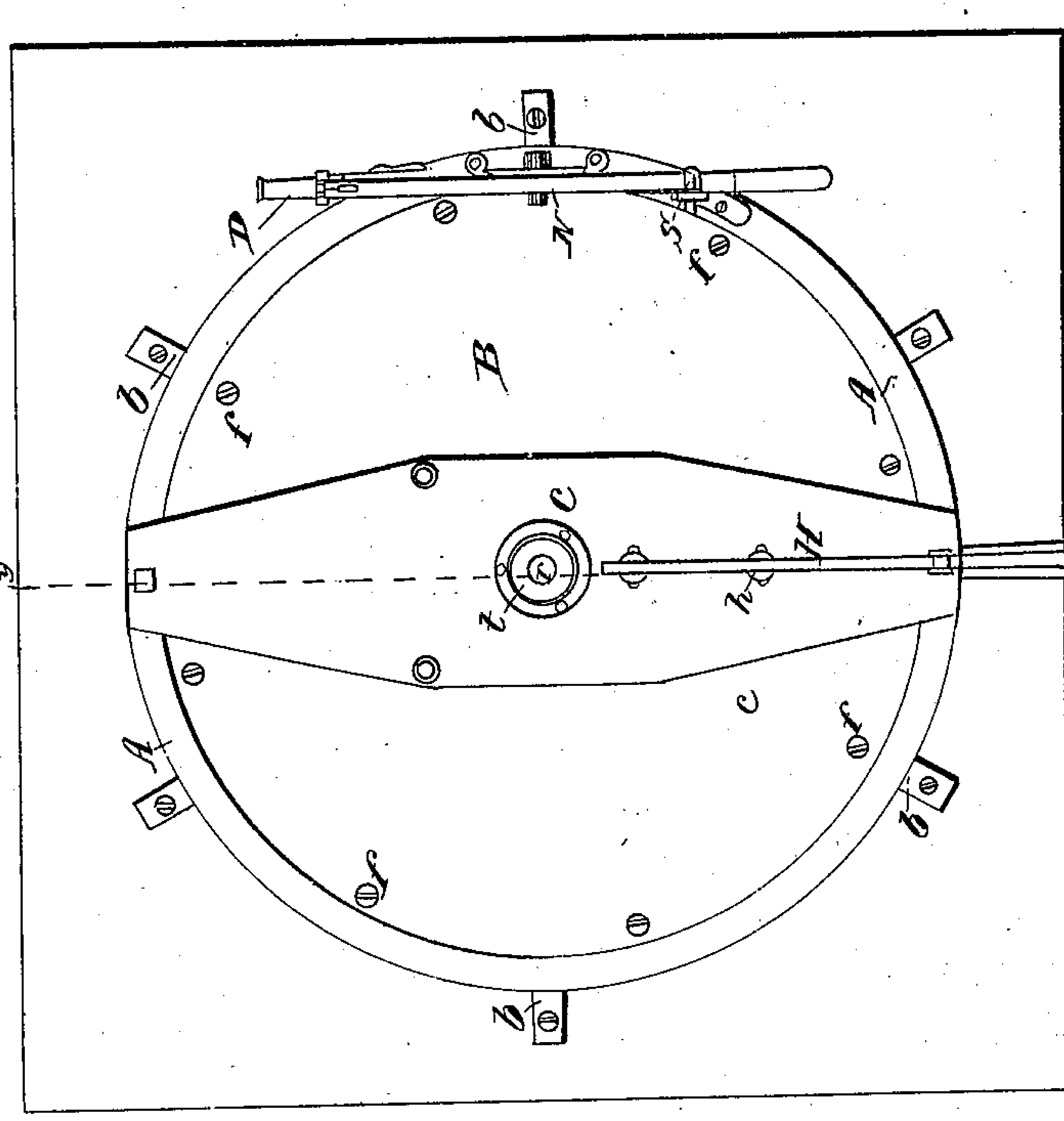
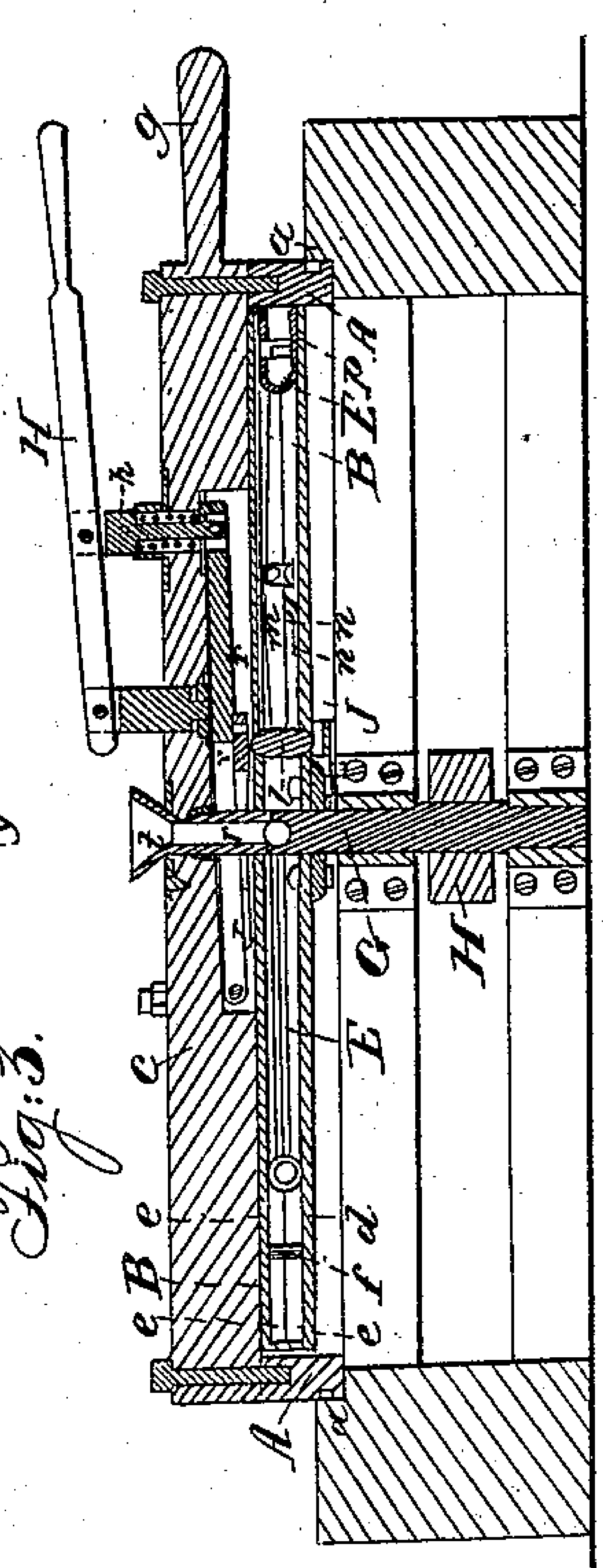


Fig:3.



N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

A. B. SMITH AND WM. WEAVER, OF CLINTON, PENNSYLVANIA.

IMPROVED MACHINE FOR THROWING PROJECTILES.

Specification forming part of Letters Patent No. **15,529**, dated August 12, 1856.

To all whom it may concern:

Be it known that we, A. B. SMITH and WILLIAM WEAVER, of Clinton, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Machine for Throwing Projectiles by Centrifugal Force; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making a part of this specification—

Figure 1 being a top view of a machine embodying the essential features of our invention; Fig. 2, a horizontal section thereof through the middle of the revolving disk; Fig. 3, a vertical section in the line *y y* of Figs. 1 and 2; Fig. 4, a view of the under side of a part detached.

Like letters designate corresponding parts in all the figures.

The nature of our invention consists in such a construction and arrangement of the revolving disk or its equivalent, by which the motion is communicated to the projectiles, that while in rapid revolution and without checking its speed the balls or projectiles may be placed in it and conveyed to the hurling-point, in the meantime acquiring the necessary velocity so gradually as to produce no perceptible or injurious concussion, and also in the improved manner of controlling and regulating the discharge and direction of the projectiles.

As an essential portion of the machine, we employ a disk, B, or its equivalent—such as a sphere or ring—making it of sufficient strength and firmness to sustain a rapid revolution. This is mounted in a strong frame of any convenient construction, whereby the requisite velocity may be given to it by means of steam, horse-power, or any other convenient motor. In the drawings, G represents the spindle or shaft on which the disk turns, the power being communicated to it by a band passing around a pulley, H. This disk is situated within a firm stationary ring, A, and revolves as close as possible to the inside thereof without coming in contact therewith. Said ring is made smooth and regular on its inner surface, so as to offer as little resistance by friction to the motion of the balls as possible. It is arranged so as to be turned round in any direction upon the frame in order to direct the projectiles to any point horizontally, being provided for that purpose with a groove, *a*, in its outer periphery, into which ears or clips *b b*, secured to the frame, extend, this enabling the ring to turn without permitting it to be raised from the frame. Any other convenient mode of securing it may be employed, if desirable.

A handle, *g*, is used for the purpose of directing the muzzle of the ring.

Through one side of the ring a cylindrical aperture, *x*, Fig. 2, is formed, of the desired diameter, the side thereof farthest from the center being in a straight line exactly a tangent to the inner periphery of the ring. In the orifice of the aperture is fitted a muzzle, D, jointed to the ring so as to turn vertically to the plane of the ring. This muzzle is connected with a lever, N, whereby it can be pointed to the object.

An adjustable sight, *s*, may be added to the ring above the lever N, for the purpose of rendering the aim accurate.

Instead of a movable muzzle, the whole ring may be made to turn at right angles to its plane by any suitable arrangement.

For throwing bombs and balls at a high angle the machine may be made so as to turn the disk to a vertical position, so that any angle to the horizon may be aimed at by turning the ring. The circle around this may be graduated so as to accurately ascertain the degree at which to point.

The disk B may be conveniently made by uniting two plates, *c d*, there being flanges *e e* on their peripheries of sufficient width to keep them at the proper distance apart, as shown in Fig. 3, and bolts *f f* being employed to keep them firmly together. It should be made strong and be well centered or poised on its spindle. Between the two plates is firmly secured a tube, E, through which to convey the balls from the center to the circumference of the disk.

The spindle or shaft is made hollow, as shown at *r*, the lower end thereof communicating with the inner end of the tube, as seen in Fig. 2, so that by putting the balls in a suitable tunnel or hopper, *t*, they may be conveyed into the tube while the disk is in rapid motion, since the only resistance which rapid revolution offers to the insertion of the balls is the necessity of giving them a considerable motion upon their axes almost instantaneously; but as the balls may rest almost upon a single point, the disk may revolve many times before communicating a very rapid revolution to the balls, thus allowing sufficient time to overcome their inertia without violence.

It is indispensable to the practical or at least to the proper action of the machine in throwing heavy projectiles—such as common balls—that the rapid velocity should be communicated gradually to the balls. In order to do this without stopping or checking the motion of the disk, it should be allowed to revolve many times while the balls are passing from the center to the circumference thereof, and consequently in the meantime acquiring the successive increases of velocity which the different points of distance from the center of the said disk passed over by said balls possess. To accomplish this important desideratum, we coil the tube E around from the center to the circumference of the disk in the direction of the disk's revolution. By shortening or prolonging the coil the balls may be set in motion quickly or slowly, just as desired. Thus, if the tube should proceed directly to the circumference, or radially, the movement of the balls to the circumference would be almost instantaneous, and produce a concussion which would not be admissible; but, on the other hand, if the tube were nearly concentric with the disk, the balls would remain at rest in the tube, or even recede therein toward the center. It is obvious, therefore, that any intermediate velocity may be given between these extremes. We find by experiment that a single coil of the tube, or once passing around the disk, as shown in the drawings, will produce a proper motion from the center to the circumference, where small balls are used; but for large cannon-balls it may be desirable to render the motion more slowly outward to the circumference than a single coil will effect, in which case the coil should extend round farther till the desired speed of movement may be obtained. At the outer end the tube turns radially outward, or nearly so, for a short distance, which should be as little as may be and allow room for the valve *o*, and a space, *p*, outside of the valve, sufficient to permit the valve to fall behind it, or even behind its center, will answer the purpose. The object of making this portion *p* as short as may be is to render the concussion as light as possible, for this last movement of the balls in passing the valve is instantaneous, and if the ball is large the velocity given it in passing would produce some degree of concussion. As soon as the balls pass the valve they come in contact with the ring A, and as soon as brought to the aperture *x* fly off.

We arrange the valve so that the balls will invariably first strike the ring at any particular point desired, whatever position the ring may have with respect to the disk, or in whichever direction it may point, in the following manner: Said valve is attached to the outer end of a vibrating lever, *m*, the fulcrum of which is near its middle. At the other end the lever is secured to a pin or bolt, *l*, which has a sliding motion up and down. When the valve *o* is shut said bolt *l* just or nearly reached a cam, L, which is secured upon a vibrating cam-seat, I, in the under side of a cross-bar, C, attached permanently to the ring A. This cam is ordinarily held up away from the bolt by means of a spring, *i*, Fig. 3, or its equivalent. A lever, H, on the top of the cross-bar C is connected with the cam-seat I by a rod, *h*, and is so arranged that by depressing it the cam will also be depressed, and consequently press upon the bolt *l* when it is brought round to the slope or wedge of the cam, and thereby lift the valve. The valve immediately shuts again as soon as the bolt passes the cam. Thus it is evident that the point of the ring where the ball will be permitted to reach it when the valve is opened will depend solely upon the position of the cross-bar C on the ring and the relative position of the cam L thereto; and since these remain fixed, unless purposely changed, it follows that the point of the ring where the balls will first reach it will be where said cross-bar and cam are set to determine it. The cam may be made to be shifted in position so as to vary the point of the ball's approach to the ring. The method of doing this is shown in Fig. 4. The cam L is provided with a series of holes arranged in a circle, so that by putting screws through different pairs of these holes to attach the cam to its seat the object will be effected.

A spring, *n*, or its equivalent, serves to keep the valve *o* shut. It may occasionally happen that the valve will close upon a ball and there hold it. In such cases, in order to insure the liberation of the ball in proper season to escape through the discharging-aperture *x*, we make use of another cam, *j*, which is kept permanently in its place below the revolving disk by a bar, M, extending across the lower side of the ring A. The lower end of the bolt *l*, in every revolution of the disk, strikes this cam at a proper place before the outer end, *p*, of the ball-tube reaches the discharging-aperture, and thereby greatly increases the closing pressure of the valve, by which the balls, if held by the valve, will be driven from under it.

The lower side of the valve may slant outward, as shown in Fig. 3, so as to cause the ball to fly outward rather than inward. The bar M should be somewhat yielding or elastic to enable it to give way in case the ball should ever fail to be set free from the valve.

When small shot are to be thrown in rapid succession the lever H may be held down continually, so that a bolt may be discharged at every revolution of the disk if balls can be fed into the tube fast enough for that.

It is obvious that any desired velocity may be given to projectiles by this machine. One has only to calculate the speed of the disk necessary to produce any required velocity of the balls, and then to gear the machine so that the moving-power will produce the requisite number of revolutions in any given time. The balls will fly off with the same velocity with which the periphery of the disk may be moving.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of the ring which incloses the revolving disk with a movable muzzle, in the manner and for the purpose specified.

2. The spiral tube E for gradually communicating the motion of the disk to the balls, when its outer end is turned radially or thereabout outward, and is provided with a valve in said radial portion, substantially in the manner and for the purposes herein set forth.

3. The mode of opening the valve *o*, substantially as herein described, whereby the balls are invariably brought to the ring A at a given point, and that point changeable at pleasure irrespective of the position of the ring relative to the disk or of the point to which it may chance to be directed.

4. The employment of the cam *j* in the manner and for the purpose herein described.

In witness that the above is a true description of our improved machine for throwing projectiles by centrifugal force we hereunto set our hands this 26th day of June, 1856.

A. B. SMITH.
WILLIAM WEAVER.

Witnesses:
JOHN S. HOLLINGSHEAD,
R. F. OSGOOD.