No. 50,598. PATENTED OCT. 24, 1865.

E. KAYLOR.

MACHINE FOR TURNING RIM BASES OF CANNON.

Fig. 1.

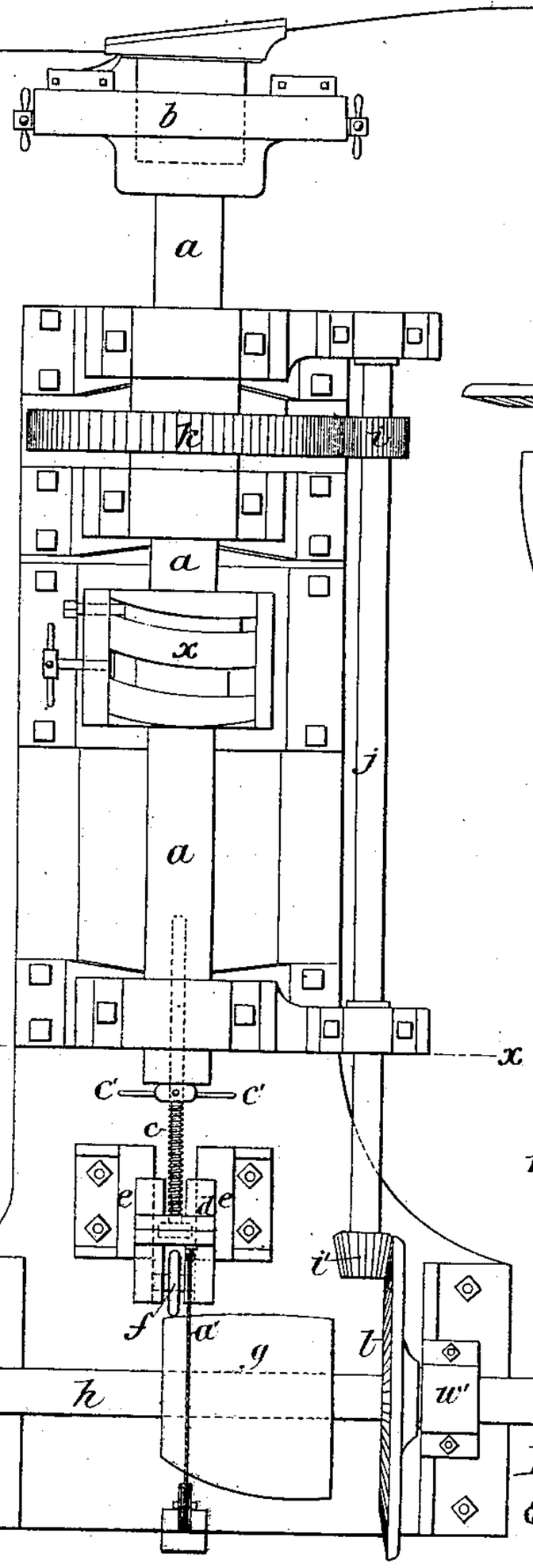
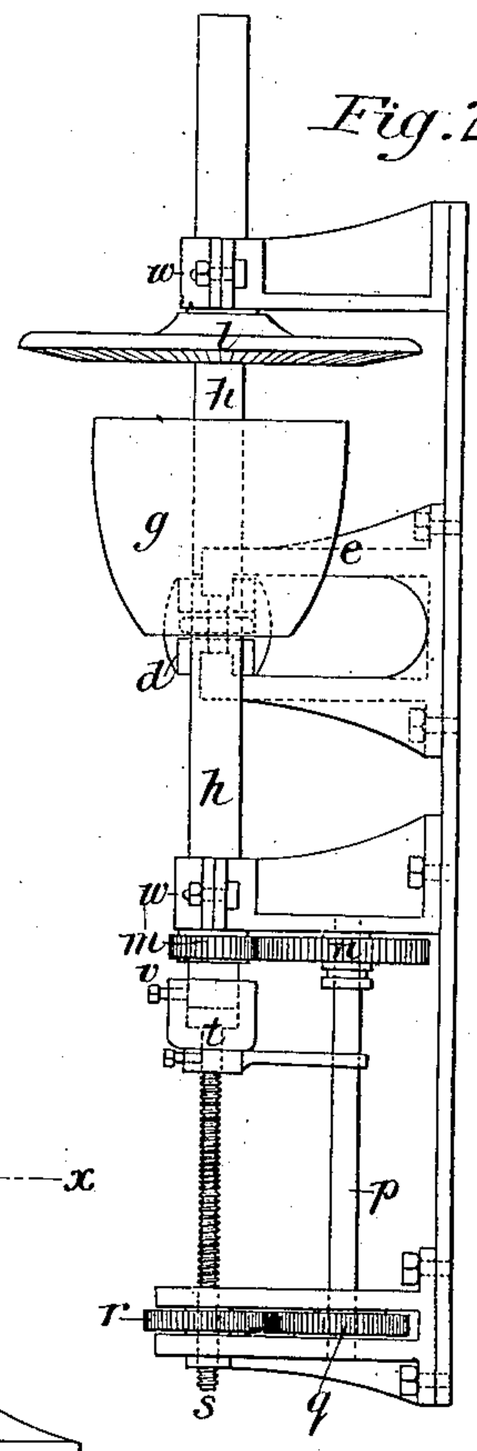


Fig. 2.



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IMPROVEMENT IN MACHINES FOR TURNING RIM-BASES OF CANNON.

Specification forming part of Letters Patent No. **50,598**, dated October 24, 1865.

To all whom it may concern:

Be it known that I, EDWARD KAYLOR, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machinery for Planing the Rim-Bases of Guns and other Irregular Curved Surfaces; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan or top view of my machine, showing the cutter or planing-tool at work planing the rim-base of a gun. Fig. 2 is an end elevation of that portion of my machine which is in the rear of the red line *x x*, Fig. 1.

The same letters of reference are used in both figures to denote like parts of the machine.

My invention is an improvement on the machine for planing the rim-bases of guns and other irregular curved shapes, for which Letters Patent of the United States were granted to me on the 12th of July, 1864. That machine consists of a horizontal shaft placed, when at work, in the line of the axis of the trunnions of the gun and terminating in a chuck, which revolves with the shaft. The chuck carries a cutter or planing-tool, which is susceptible of motion to or from the axis of the shaft by means of a slide in the chuck. The motion of the shaft and chuck just described would plane or dress a plane surface parallel to the face of the chuck; but in order to cause the cutter to plane a curved surface as it revolves around its shaft and either approaches or recedes from its axis, it is necessary to give the chuck a motion to or from the body which is being planed, the combined motion thus effected producing a curved surface, the character of which is determined by means of a grooved barrel on the shaft with a stationary pin entering the groove, so that as the shaft and grooved barrel revolve they receive a horizontal motion to or from the gun or other body being planed, corresponding exactly to the curvature in the groove. This machine operates admirably where the rim-base is cylindrical, and the curve to be planed is that created by the intersection of the cylindrical rim-base with the body of the gun; but in large guns where the rim-base is not cylindrical, but has an irregular-curved surface and increases in diameter as it approaches the body of the gun until the curved surface of the rim-base gradually merges into the curved surface of the body of the gun, there are two practical difficulties in the operation of the machine described in my former patent, the first being that so long as any one groove in the barrel is used the curve planed is the same, and when it becomes necessary to alter the curve another groove has to be used of different curvature, so that the transition is sudden instead of being gradual; and the other difficulty is that as the cutter is working on a curved surface descending toward the body of the gun, the tendency of the cutter is to slip down, and the strain thus created has to be borne entirely by the pin which enters the groove in the barrel and regulates the curved motion of the cutter. This strain often bends the guide-pin, which spoils the operation of the machine.

Both of these difficulties are entirely obviated by the improvement which I have made in my machine, which I am about to describe and which consists in dispensing entirely with the use of the grooved barrel and guide-pin and giving the required movement to the chuck-shaft, by direct pressure at the end of the shaft and in the direction of its axis, the end of the shaft, to which a guide-roller is attached, being made to press against the face of a revolving-guide pulley, which is of such shape that during each revolution of the chuck-shaft (corresponding with one complete revolution of the guide-pulley) the shaft is moved in and out toward or from the gun, according to the irregular shape of the guide-pulley, and as the guide-pulley is slowly fed along with the edge of the friction-roller resting on it, the shape of the guide-pulley changes gradually, so as to change the shape of the curve described by the revolving cutter.

To enable others skilled in the art to make and use my improved machine, I will proceed to describe more minutely its construction and operation.

The machine in front of the line *x x*, Fig. 1, may be precisely like that described in the specification accompanying my former patent of July 12, 1864, the grooved barrel *x*, guide-pin *y*, by which the motion of the cutter-shaft *a* is effected may be retained, so that the machine may be used as described in my patent

of July 12, 1864, which answers very well for some descriptions of guns; but when the improvement which I am about to describe is used the guide-pin *y* must be withdrawn from the groove in the barrel *x*.

My improvement consists in adding to the machine described in my patent of July 12th, 1864, the machinery shown in Fig. 1 in the rear of the line *x x*, and in Fig. 2.

A strong screw, *c*, is inserted into a female screw in the axis of the shaft *a* (which carries the chuck *b* and planing-tool) at the rear end.

The rear end of the screw *c* is attached to a sliding block, *d*, which slides on ways on top of the standard *e*, and by turning the handles *c'* attached to the screw *c* the distance from the sliding block *d* and the end of the main shaft *a* is adjusted at pleasure.

At the rear end of the sliding block *d* is a revolving friction-roller, *f*, which is rounded at its periphery so as to present a smooth but not broad edge to the surface of the guide-pulley *g*. The guide-pulley *g* is a rounded block of iron of peculiar shape which is keyed to the horizontal transverse shaft *h*, which is set at right angles to the main or chuck shaft *a*. The shape of the guide-pulley *g* is that of an irregular cylinder, the distance from its axis to the circumference continually varying at different points in any plane at right angles to the axis of the shaft, and the shape of a cross-section at any such plane differing from the cross-section at other planes parallel thereto. The shape of this guide-pulley is determined by the shape of the rim-base or other curved surface to be planed, as hereinafter explained. The transverse or pulley shaft *h* is made to revolve at the same speed (or number of revolutions per minute) as the main shaft by means of any suitable gearing. As the guide-pulley *g* revolves with the main shaft *a* it has also a slow movement in one direction, either from right to left or from left to right in the line of axis of its shaft *h*, so that the track of the friction-roller *f* over the surface of the guide-pulley *g* is that of a spiral, the roller at each revolution of the guide-pulley touching a different portion of its surface. This slow side movement of the transverse shaft *h*, which carries the guide-pulley *g*, is effected by means of a screw-shaft, *s*, a head on which turns a socket, *t*, which is rigidly fixed to the end of the transverse shaft *h*, and revolves therewith without causing the screw *s* to turn with it. The other end of the screw *s* has its bearing in the center of the wheel *r*, which is tapped to form a nut on the screw *s*, and a slow rotation on its axis is given to the wheel *r* by suitable gearing from the transverse shaft *h*. The slow revolution of the nut-pinion *r* on the screw *s* causes the screw to be drawn out through the nut in the pinion *r*, and thus to draw with it the transverse shaft *h*, which slides through its bearings *w w'* and through the eye of the pinion *m*. The length of the guide-pulley *g* is such that when the friction-roller *f* has traversed spirally around the length of the pulley, the work of planing will be completed.

It is important that each revolution of the chuck carrying the planing-tool should exactly correspond with one revolution of the guide-pulley *g*, as otherwise the surface planed by the use of a guide-pulley would not always be the same.

When the surface to be planed by the chuck is not (like the trunnion of a gun) parallel to the axis of the main shaft, but is either at right angles to that axis, or is a curved or plane surface passing from a line parallel to the axis of the shaft to a plane at right angles thereto, it is necessary that the planing-tool *z*, which slides in the chuck *b*, should be gradually moved outward from the center toward the circumference of the chuck, or that it should be moved outward a distance nearly equal to the width of its cutting-edge after each complete revolution of the chuck. This is effected by means of a screw, *o*, in the chuck, one arm of which is turned at each revolution by coming in contact with a "knocker" or pin projecting from some part of the frame of the machine and crossing the path of the arms of the screw *o* at one point in its revolution, and which is a common device to effect a repeated feed motion.

The shaft *a* is moved forward toward the gun or body to be planed by the pressure of the guide-pulley *g* acting as a cam on the friction-roller *f* in the sliding block *d*, and in order to draw the shaft back, so as to keep the friction-roller *f* pressing against the face of the guide-pulley *g*, a rope or chain, *a'*, is attached to the end of the sliding block *d* with a weight, *w'*, sufficient to draw the shaft backward when it is allowed by the pulley *g* to recede.

The peculiarity of my improvement is that by means of the guide-pulley *g*, having a double motion—that is, revolving on its axis and moving sidewise at right angles to the shaft *a*, and thus acting as a spiral cam—the curved motion of the point of the planing-tool *z* on the surface to be planed may be different on each revolution of the chuck from what it was on the preceding revolutions, and thereby any curved or waving surface, how irregular soever, may be planed or graven in the body to be acted upon. As the guide-pulley *g*, serving as a former to regulate the shape of curved or waving surface to be planed, revolves spirally against the edge of the friction-roller, the shape of the guide-pulley will present to the eye no similarity of appearance to the surface produced by its use, and the calculation of the shape of the guide-roller required to produce any given shape would be an extremely intricate one. In practice, however, there is no difficulty in making a forming-block or guide-pulley to produce the required shape with the planer. It is done by placing in front of the chuck a type or model of the form or surface required to be reproduced by the planer.

In lieu of the planer *z* or cutting-tool a smooth blunt point is substituted, and instead of the

friction-roller *f*, at the other end of the shaft *a*, is set a rigidly-fixed cutting-tool. A cylindrical block of soft iron of suitable size is placed on the transverse shaft *h*, and the machine being set in motion, the cutter which occupies the place of the friction-roller *f*, being accurately guided to its work by the motion of the shaft *a*, produced by the blunt point passing round the type or model, will turn the block down to the required shape of the forming-block or guide-pulley, which will in its turn reproduce the shape of the original model.

Having thus described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

The combination of the shaft *a*, carrying a revolving cutter, *b*, or planing-tool susceptible of feed motion to and from the center of its shaft, with the revolving and sliding pattern or forming-block *g*, moving at right angles to the shaft *a*, and so shaped as to give to the cutter an irregular motion for the purpose of planing or cutting irregular curved surfaces.

In testimony whereof I, the said EDWARD KAYLOR, have hereunto set my hand.

EDWARD KAYLOR.

Witnesses:

WILLIAM RAMAGE,

D. H. GOODY.