

THOMAS SMITH.

Improvement in Machines for Twisting Metal.

No. 127,436.

Patented June 4, 1872.

Fig. 1.

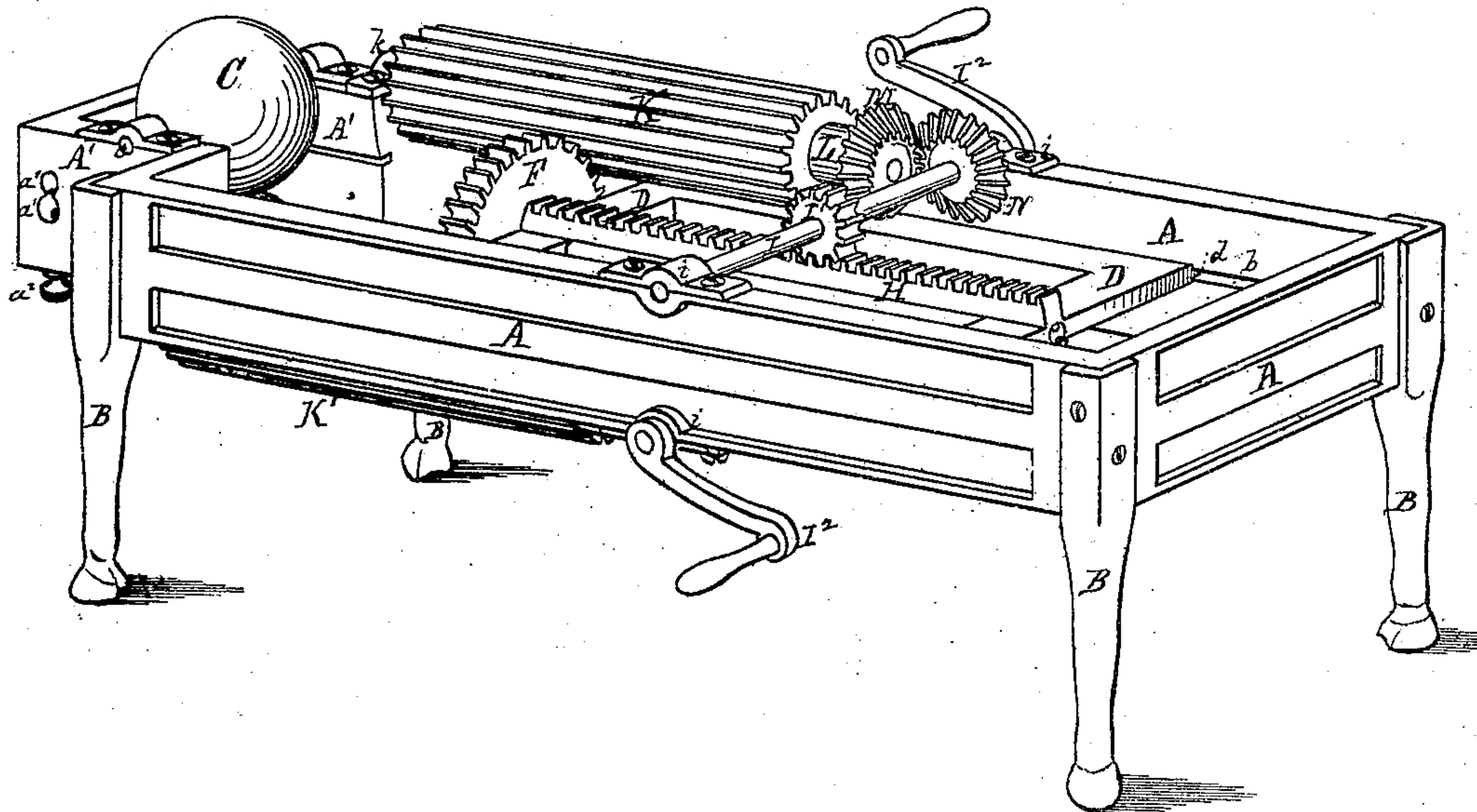
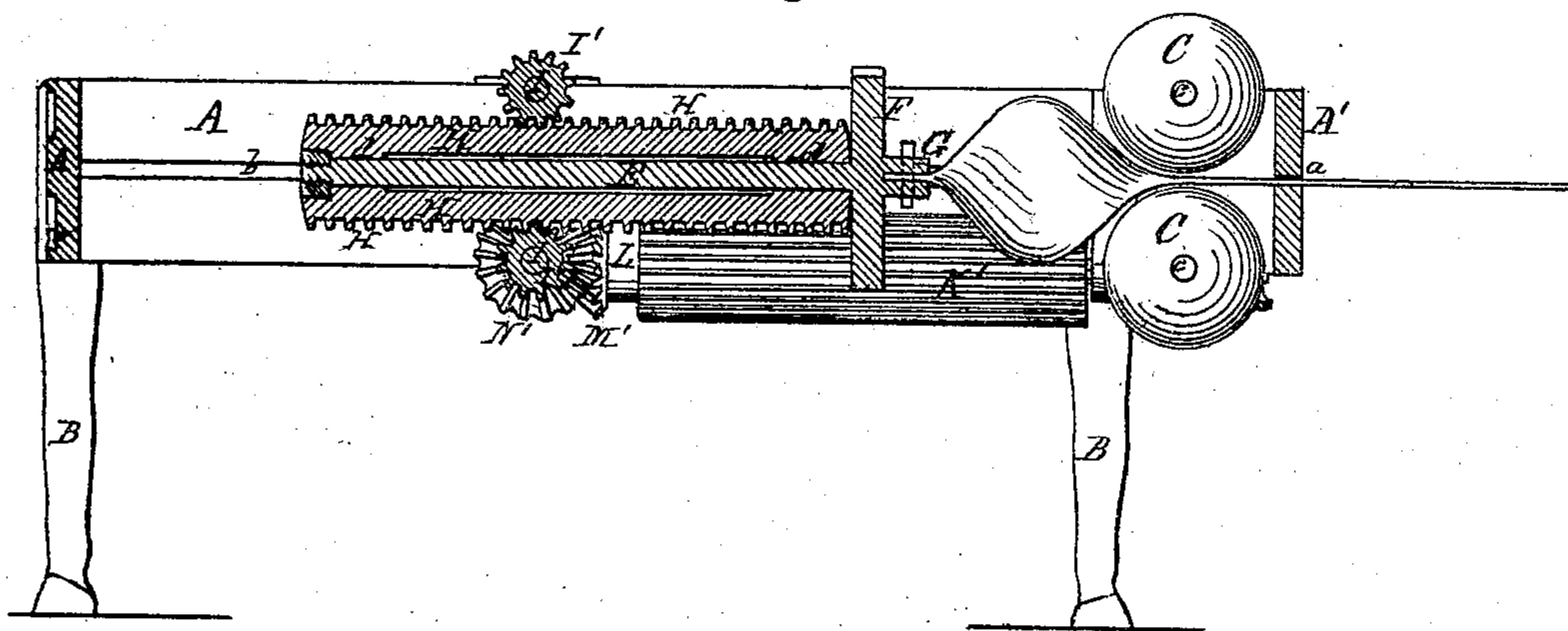


Fig. 2.



Witnesses.

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IMPROVEMENT IN MACHINES FOR TWISTING METAL.

Specification forming part of Letters Patent No. 127,436, dated June 4, 1872.

To all whom it may concern:

Be it known that I, THOMAS SMITH, of Green Island, county of Albany, State of New York, have invented a new and useful Improvement in Machine for Making Propeller-Wheels or Augers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of my improved machine, and Fig. 2 is a longitudinal vertical section through the same.

Similar letters of reference denote corresponding parts in both the figures.

My invention relates to a novel means for forming screws or augers of any required diameter, but more particularly designed for making propeller wheels or screws varying in size and diameter according to the size or capacity of the vessel to which they are to be applied; and consists, first, in combining with a pair of molding-rolls a device for grasping the end of the plate to be operated upon, and a mechanism for imparting to said grasping device, simultaneously, both a rotary and a rectilinear movement, said mechanism being so regulated that the velocities of said movements shall be such as to give to the plate the required reversed curvatures, as hereinafter described; second, in a novel arrangement of mechanism for giving the spiral longitudinal feed movement to the holding-jaw or clamp.

In the accompanying drawing, A represents a strong rectangular frame, made, by preference, of iron, and of a size corresponding to the size of the auger or screw it is intended to make, and mounted on legs B to give it the desired elevation. One of the end pieces, A', of said frame is made in angular form, as shown in Fig. 1, in such manner as to form a contracted throat-extension of the frame, of a width about equal to the width of plate upon which the machine is intended to operate, and is provided with a central slit or opening, *a*, through which the plate is fed to the machine. Within the throat-extension, or just inside of frame A, and in front of the feed-opening *a*, is arranged a pair of spherical or semi-spherical rollers, C C, of a diameter near about equal to the width of plate to be operated upon. Said rollers are mounted on shafts *c*, which rotate freely in bearings in

frame A or end plate A', operated by the friction of the plate moving or being fed forward between them, and serve to steady the movement of the plate, and also to give direction to the twist or thread of the screw. These rollers C are represented as formed each in one piece, and mounted on horizontal shafts *c*, but it will be obvious that they may be composed of a series of rings or washers of varying diameter, assuming, as a whole, the semi-spherical or spherical form shown and described, and, by arranging these rings so as run loosely and independently on their shafts, a uniform surface speed will be obtained, obviating the drag at smaller circles of the rolls which would result from making them in a single piece. They may also be placed upon vertical shafts, if preferred, one pendent, the other upright, at a distance apart about equal to the thickness of the plate operated upon. D is a strong rectangular carriage, provided at its opposite sides with tongues *d*, which match into and are adapted to slide longitudinally in grooves *b* in the frame A. Centrally of the width of the carriage D is placed a horizontal shaft, E, mounted and rotating in bearings *d* in said carriage, and provided at its forward end with a spur-wheel or pinion, F, through which a rotary motion is imparted to said shaft, as hereinafter explained, and at its opposite end with a nut, through which end-motion of the shaft relative to its carriage is prevented. The pinion or spur-wheel F is armed on its outer or forward face with a jaw or clamp, G, which is perforated at suitable intervals, and provided with set-screws or equivalent means for seizing and holding one end of the plate, as hereinafter explained. H H are toothed racks, formed upon or rigidly attached to the carriage D, one on either side of the carriage, and arranged by preference about in the same vertical plane with the shaft E, extending the full length of said carriage, as represented in the drawing. I I are horizontal transverse shafts, mounted in bearings *i i'* in the frame A, one arranged above and the other below said frame, as shown, and provided centrally with spur-pinions I¹, which engage with the racks H, and through which a longitudinal movement is imparted to said racks and the intermediate carriage to which the racks are connected in a manner that will

be readily understood. $K K'$ are barrel-pinions or spur-wheels, arranged longitudinally relative to frame A , and mounted in bearings k in end plate A' of the frame at one end, and at the opposite ends in inwardly-projecting ears or lugs L , formed on or attached to the side pieces of frame A . These barrel spur-wheels are of a length equal to the distance traversed by the carriage D , and engage with and drive the spur-wheel F , as will be presently explained. They are arranged diagonally on opposite sides of the frame, with the shaft of one, K , above, and the other, K' , below the carriage D , and their shafts are provided at their outer ends with bevel-pinions $M M'$, engaging with and operated by bevel-wheels $N N'$, mounted on the transverse shafts I , and so arranged as to rotate wheels $K K'$ in the same direction. The outer ends of shafts I may be provided with cranks I^2 , adapting them to be operated by hand or pulleys, or gearing may be substituted adapting them to be operated by any convenient power. The machine, constructed as above described, is intended to be placed within convenient distance of the furnace or chamber in which the plates to be operated upon are heated to a bright red heat; after which they are drawn out sufficiently far to permit one end of the plate to be passed through the feed-opening a in the end plate A' of the machine, and passed between the rollers C , to be connected to the pinion or wheel F through the medium of the clamp or jaw G and set-screws, after which motion is imparted to shafts I , and through them to pinions or barrel-wheels K and spur-wheel F , which is rotated, carrying the clamp G and the end of the plate with it, and also through pinion I^1 to the racks H and traveling-carriage D , giving to said carriage and to the wheel F and clamp G' a backward movement, which, in connection with the rotary movement of the wheel and clamp, serves to draw out the plate from the furnace through the feed-opening a between the molding-rollers C , and at the same time to twist said plate into a regular spiral or auger form, as represented. In practice it will be found necessary to chill the plate or screw at a point behind rollers C —relative to the movement of the plate—just where the plate has received the required degree of twist, and this may be done by arranging a jet of water just at such point to play upon the completed portion, and prevent any additional twist upon such portion in the continued backward movement of the carriage and twisting-clamp. The frame and barrel-pinions may, of course, be made of any length desired, according to the length of screw required, and the carriage and pinions so geared or speeded as to give any desired pitch and

number of complete revolutions to the screw; but screws of materially different diameters will require different machines or a reorganization of the same machine as regards pitch of the screw and speed of parts and size of the molding-rolls for their manufacture. By the use of the mechanism described I am enabled to make propeller screws and augers of any diameter required—varying, say, from six inches to four or five feet—of any desired length, from a single flat plate or strip of metal, and perfectly regular in the twist or pitch of the screw throughout their entire length.

In some cases it may be found desirable to use supplemental horizontal feed-rolls, and provision is made for the introduction of these at perforations $a' a'$ in the end plate A' , Fig. 1. In this case the opening a may be employed to permit the free passage of the plates, if desired. Where it is desired to manufacture screws or augers of considerable length, suitable rests may be arranged at various points underneath the frame, so as to support the lengthening-screw and prevent its sagging.

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

1. The combination of a pair of molding-rolls, each in form approximating more or less to that of a sphere, a device to grasp the end of the plate, and mechanism to impart to said grasping device rotary and rectilinear movements simultaneously, said mechanism being so regulated that the velocities of movement shall be those required to impart to the plate reversed curvatures transversely corresponding to the surface of the rolls in the plane of their axes, substantially as described.

2. The combination of the clamping-jaws G , frame D , pinion F , rack and pinion $H I$, barrel-pinion K , and the gearing which connects pinions I and K to one another, substantially as described.

3. The combination, with the devices enumerated in the second claim, of a pair of rolls, substantially as described.

4. The combination, substantially as described, of the jaws G , frame D , and pinion F , the two racks and their pinions $H I$, the two barrel-pinions K , and the two sets of gearing which connect pinions I and K together.

5. The combination, with the devices set forth in the fourth claim, of a pair of rolls, substantially as described.

In testimony whereof I have hereunto set my hand this 13th day of March, A. D. 1872.

THOMAS SMITH.

Witnesses:

RD. A. HYDE,
ALEX. MAISON.