

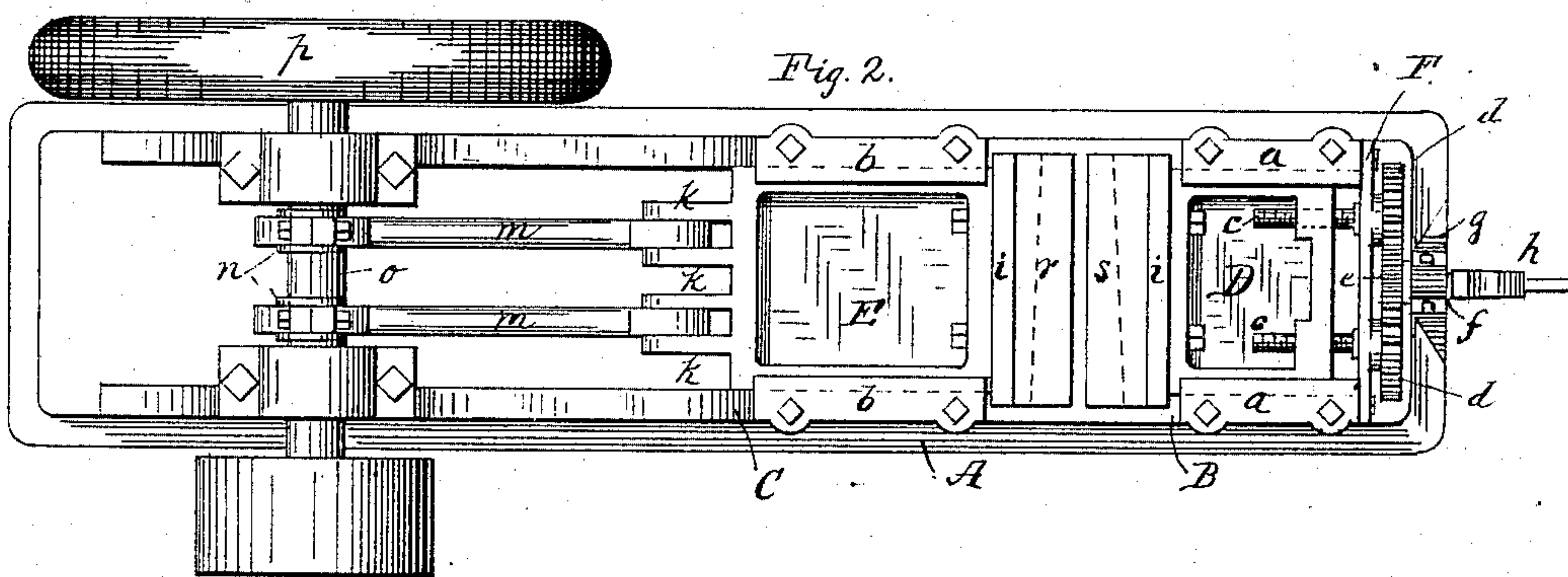
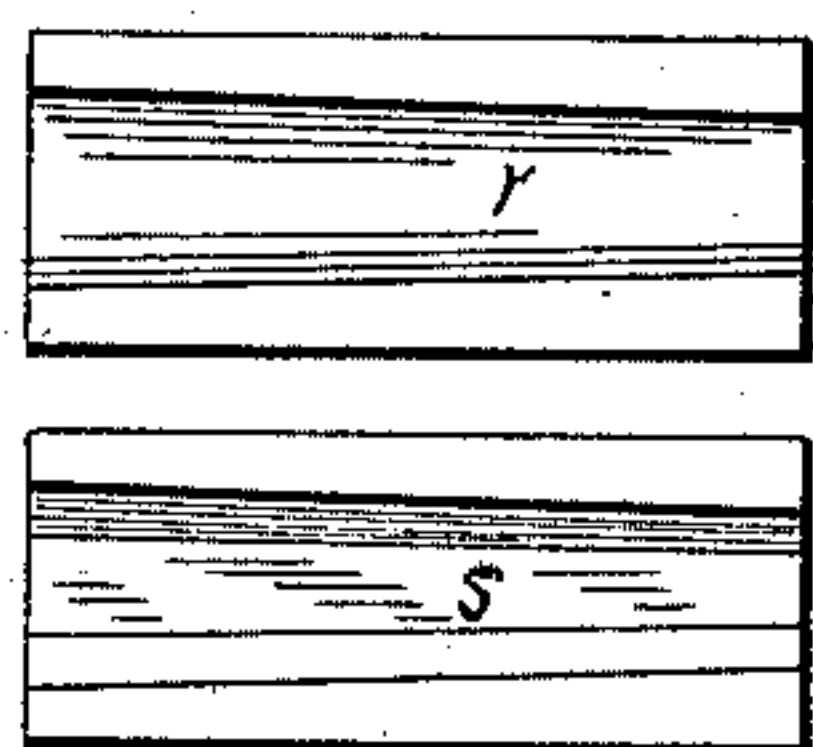
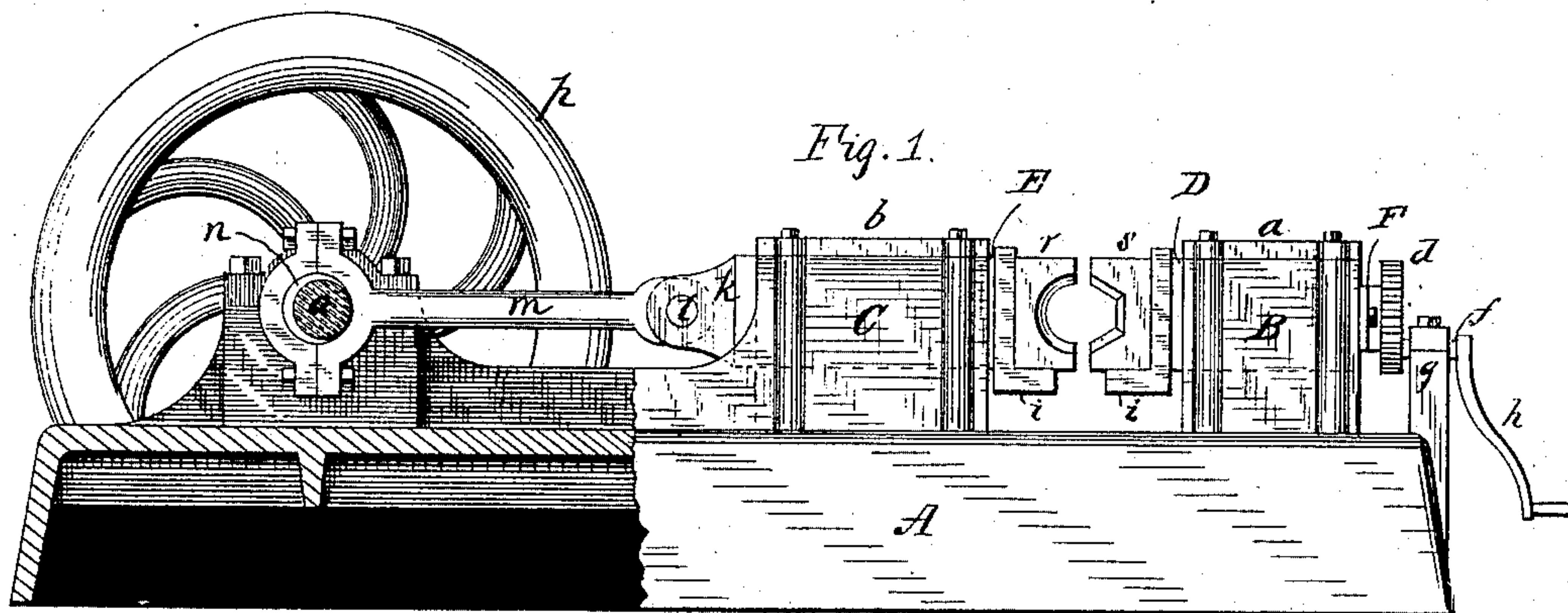
(No Model.)

R. GRACEY.

APPARATUS FOR SWAGING TUYERES.

No. 316,539.

Patented Apr. 28, 1885.



Attest:-
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UNITED STATES PATENT OFFICE.

ROBERT GRACEY, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR SWAGING TUYERES.

SPECIFICATION forming part of Letters Patent No. 316,539, dated April 28, 1885.

Application filed December 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, ROBERT GRACEY, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Swaging Tuyeres and other Conical Articles from Metal Pipes; and I do hereby declare that the following is 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 side elevation. Fig. 2 is a plan view. Fig. 3 is a face view of the dies shown in Fig. 1.

My invention consists of a combination of devices hereinafter explained and claimed.

In the drawings, A designates the bed of the machine, suitably supported at a height convenient for operation.

On one end of the frame or bed A are the slides B, and near the middle of the frame is a similar pair of slides, C. A hollow sliding head, D, fits neatly in slides B, and is retained by the overlapping flanges *a*, as shown. Similarly a hollow head, E, is fitted so as to move freely in the slides C, and is retained by the flanges *b*.

Across the outer end of slides B, or otherwise suitably secured, is a cross-bar, F, in which are journaled the two screw-rods *c*, so arranged by means of pins or collars as to have no endwise motion in the bearing E. The two screws *c* are oppositely threaded, as shown.

On the outer ends of the two screw-rods *c*, I secure the respective gear-wheels, *d*, and meshing with both wheels *d* is a small pinion, *e*, whose shaft *f* is journaled in a bearing, *g*, attached to the frame A, and has an operating-handle, *h*, as shown. By turning the handle *h* in the necessary direction both screws *c* are made to revolve simultaneously in opposite directions, and as the sliding head D is threaded to fit them it is thereby pushed inwardly or drawn outwardly, as desired. Each of the heads D E has at its inner end an L-shaped face-plate, *i*, to support the swaging-dies, which are secured by bolts to said plates. The dies are formed to suit the work to be done, the one being semi-spherical on the working-face and the other semi-hexagonal in cross-section.

At the rear end of sliding head E are lugs *k*, to which are connected, by pins *l* or other-

wise, the pitman *m*, which is in turn strapped to the eccentrics *n* of the shaft *o*, on which I prefer to place a heavy fly-wheel, *p*, as shown. By this construction the constant revolution of the shaft causes a powerful positive but limited movement of the swaging-die fitted on plate *i* of sliding head E.

In Fig. 1 I show the form of my dies for the swaging of tuyeres from metal pipes. The head E carries a die, *r*, having a tapering semi-spherical concavity, while the normally stationary die *s* on head D has a tapering semi-hexagonal concavity. While the die *r* is in rapid motion, a piece of red-hot pipe suitably held in tongs is inserted, and while being pushed in as the swaging takes place is shifted around its axis at frequent intervals. The die *r* has but a slight range of motion and cannot exceed whatever it is adjusted to, this varying from about one-eighth to one-fourth of an inch, according to the size of tuyere to be swaged; consequently there is no tendency of the pipe to "squash" or flatten; but the swaging takes place uniformly, and the pipe is quickly tapered to the proper shape and size at a single heat.

My object in adopting the hexagonal face for the die *s* lies in the fact that it touches the pipe at three points, and thus assists in preventing squashing, while it requires less power at each compression to squeeze the iron at three points than if both dies were circular and pressing on the whole surface at the same time. In fact the latter form would defeat the object sought to be accomplished.

I do not herein claim any process or method of swaging between a die and a hammer, whether by hand or power.

In the use of a hammer, impact or momentum does the compressing or swaging, and is not controllable, for the reason that before a blow is given there is no way determining the compressing effect of said blow, the iron may be too hot or not hot enough, or its quality may not be known, or it may have cinder in places. Moreover, I have discovered by actual experiments that to swage tuyeres successfully it requires a combination of the semi-spherical with the semi-hexagonal dies. I therefore disclaim the use of other dies either by hand or power.

My working or reciprocating die is moved

in the most positive manner and to an extent accurately determined. The heated metal which stands in its way must yield to exactly the same extent with each succeeding movement of the said die. The result is a gradual but absolutely uniform reduction of the article under operation to the tapering form required. This result can be had only with a positive predetermined reciprocation of the semi-spherical and semi-hexagonal dies herein described.

I am aware that it is not new to swage metal pipes by means of a die and a hammer, and I do not claim such as my invention.

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

In a tuyere-swaging machine, an adjustable

grooved die formed with a tapering semi-hexagonal groove, in combination with a 20 swaging-die having a tapering concaved groove corresponding with the taper of the semi-hexagonal groove in the stationary adjustable die, a power-shaft having an eccentric or crank mounted thereon, and a pitman connecting the said shaft and swaging-die, where- 25 by a positive but uniformly reciprocating motion is given to the die, substantially as and for the purpose herein described.

In testimony that I claim the foregoing as my 30 own I have hereto affixed my signature in presence of two witnesses.

ROBERT GRACEY.

Witnesses:

T. J. PATTERSON,

W. L. GRACEY.