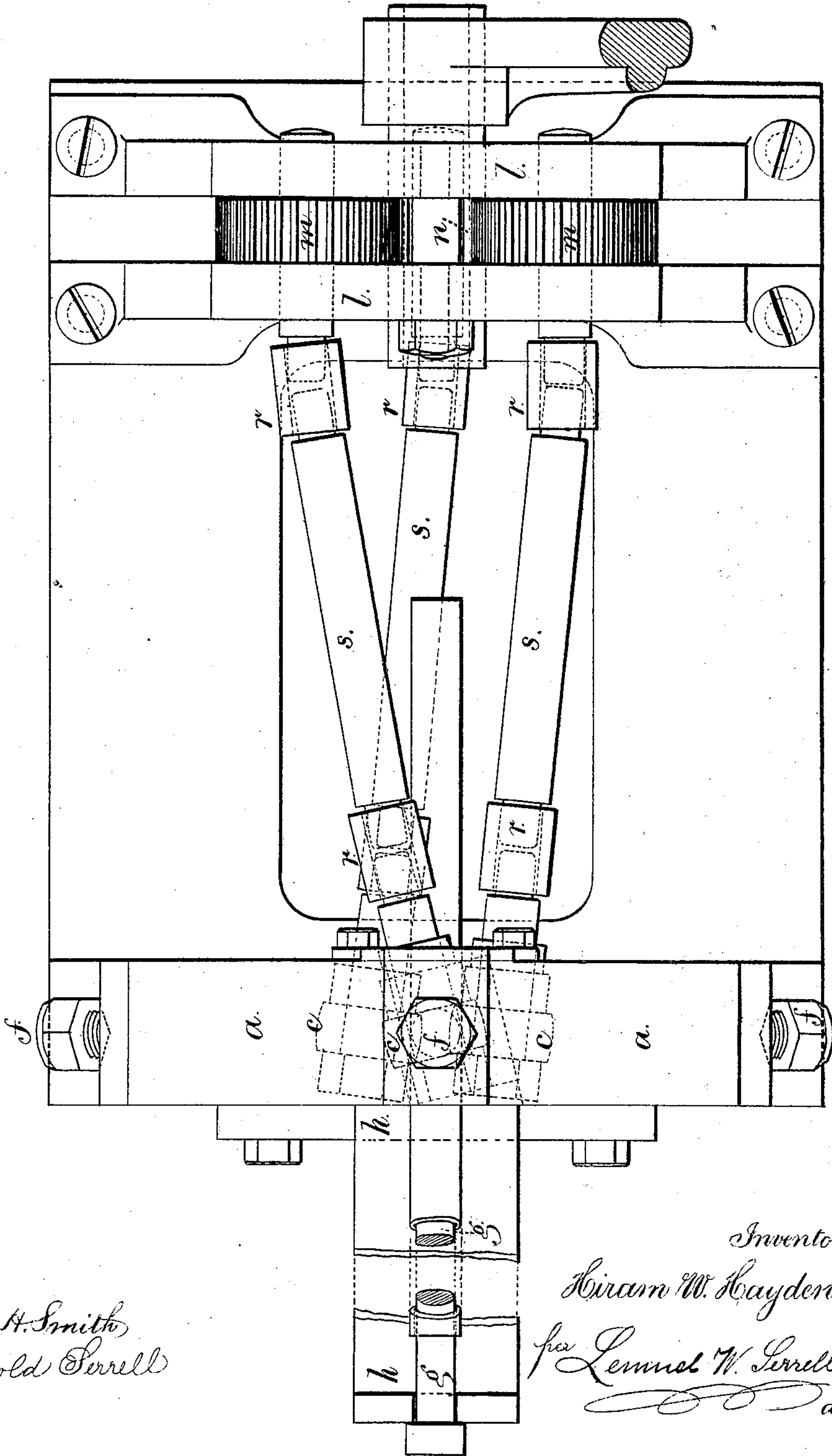


H. W. HAYDEN.
Machines for Rolling Tubing.

No. 149,309.

Patented April 7, 1874.

Fig. 1.



Witnesses,

Chas. H. Smith
Harold Serrell

Inventor

Hiram W. Hayden
per Lemuel W. Serrell
att'y

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Fig. 3.

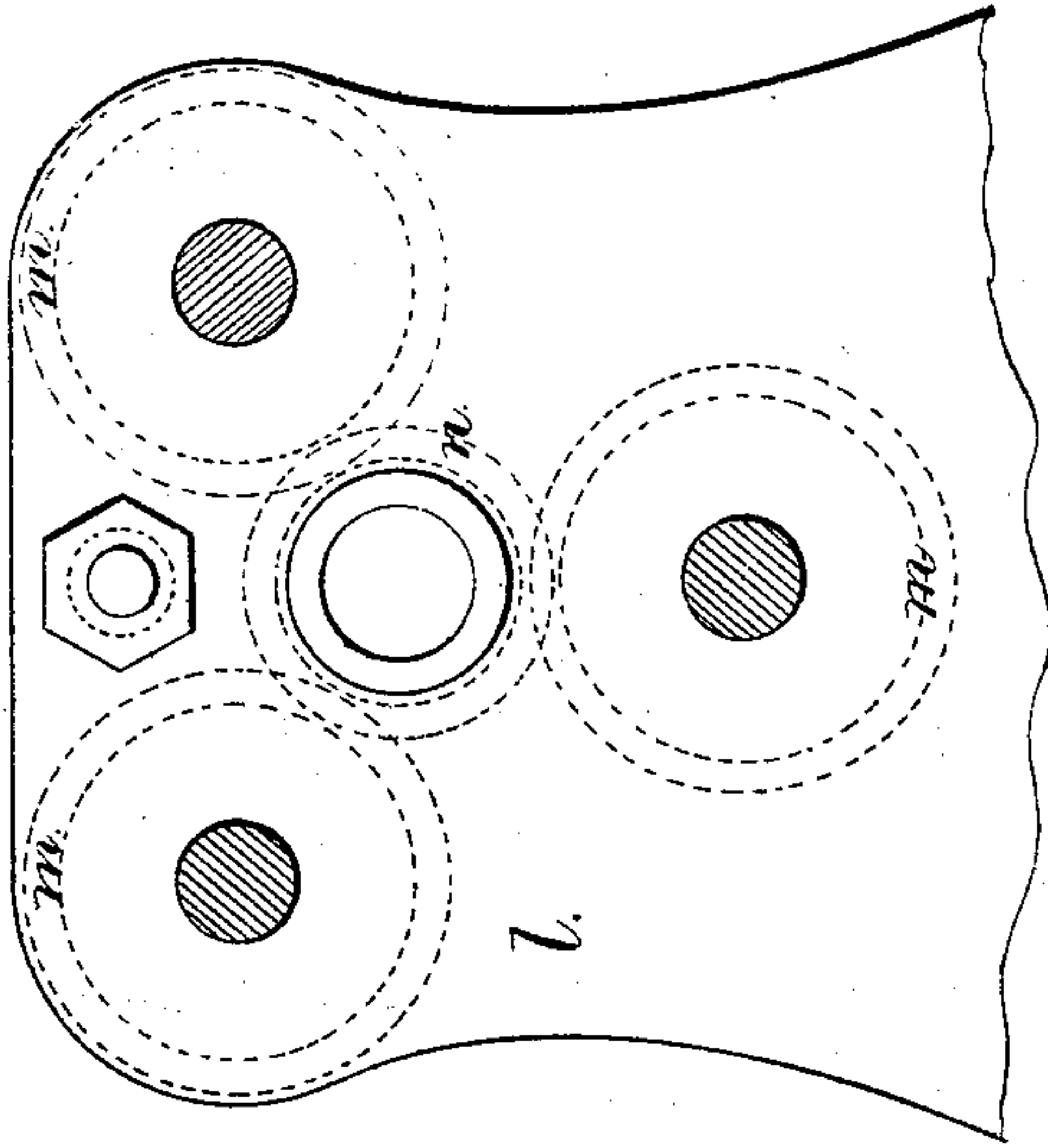
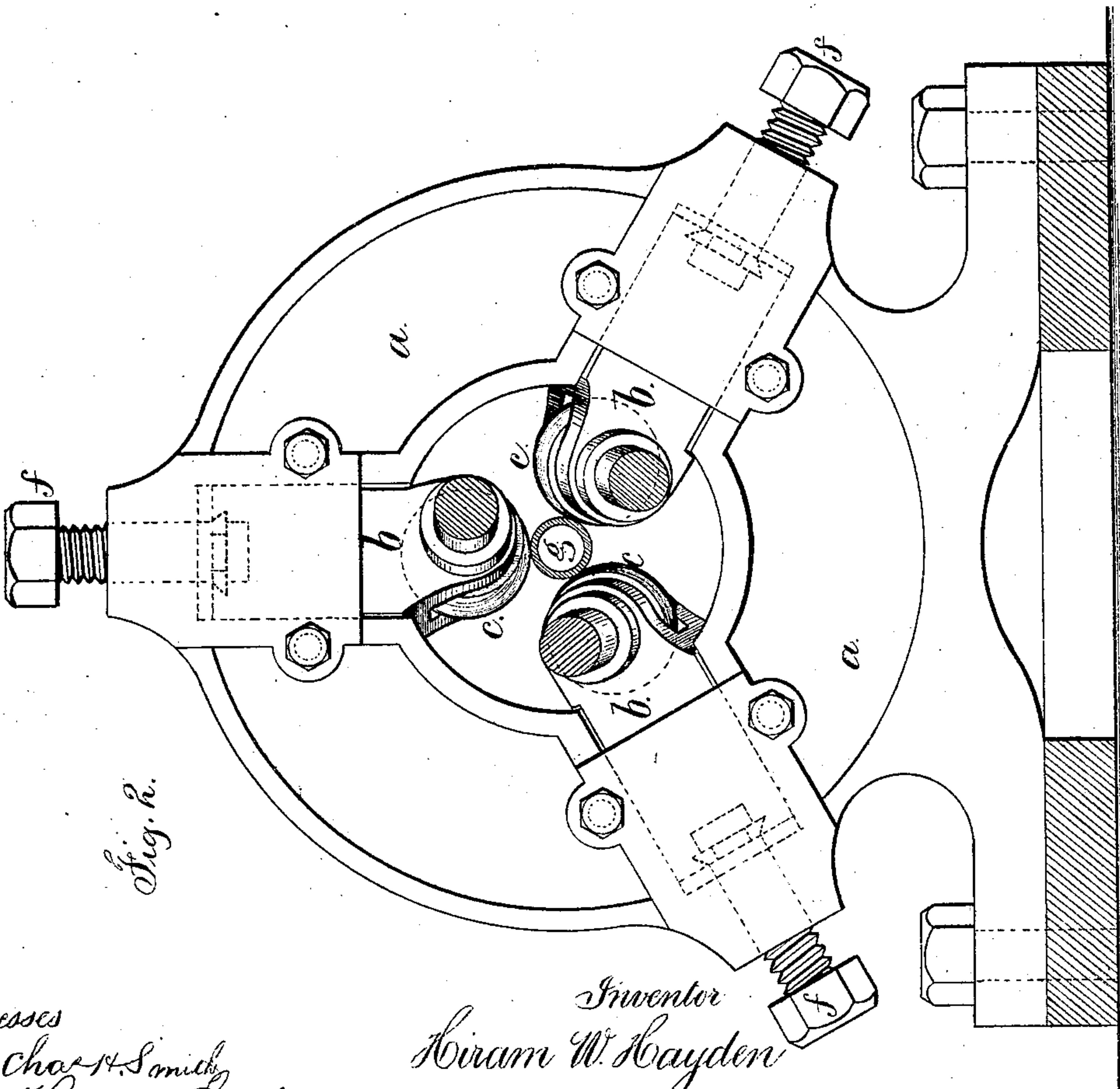


Fig. 2.



Witnesses
 Chas. S. Smith
 Harold Ferrell

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 Hiram W. Hayden
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UNITED STATES PATENT OFFICE.

HIRAM W. HAYDEN, OF WATERBURY, CONNECTICUT.

IMPROVEMENT IN MACHINES FOR ROLLING TUBING.

Specification forming part of Letters Patent No. **149,309**, dated April 7, 1874; application filed September 11, 1873.

CASE A.

To all whom it may concern:

Be it known that I, HIRAM W. HAYDEN, of Waterbury, in the county of New Haven and State of Connecticut, have invented an Improvement in Machinery for Making Seamless Metal Tubes, of which the following is a specification:

Machines have been made in which three embossing-rollers are set in a revolving head, and these operate to ornament the surface of a metal pipe that is upon a mandrel, and passes through between the rollers. The axes of the rollers are diagonal to the pipe, so as to produce spiral lines of ornamentation. This device was not adapted to reducing the thickness of the metal and elongating the tube. In other cases the tube has been formed by a spinning operation upon either a parallel or slightly-tapering mandrel, the rollers or tools being mounted in a head.

My present invention relates to a machine for rolling wrought-metal tubes and reducing the thickness of the metal, so as to elongate the pipe either from a cast ingot or from a thicker tube.

In my machine, the axes of the rollers are all at an inclination, and the rollers themselves are revolved by powers, so as to rotate the tube and roll the same in the direction of the threads of a three or more threaded screw, and thereby reduce the thickness of the tube, and draw it along from one end to the other, at the same time drawing the tube off the mandrel and revolving the mandrel.

In the drawing, Figure 1 is a plan of the machine. Fig. 2 is an elevation of the head and rollers, and Fig. 3 is an elevation of the head containing the gearing to drive the rollers.

The head *a* is of suitable size for receiving the boxes *b b b* of the reducing-rollers *c c c*. It is preferable to employ three rollers with their respective boxes; and the boxes are adjusted toward or from the center of the head by a suitable slide acted upon by the screws *f*; and the boxes for the rollers should be

connected to the respective slides, so that they can be varied in their angle of inclination to the axis of the tube; and the rollers should be slightly bulged, so as to be largest in the middle, or made with a slight taper toward the end where the tube enters, to prevent the formation of a shoulder on the pipe. The tube or ingot is placed upon the mandrel *g*, and this is held within a notch in the frame *h*, there being a neck or head to the mandrel that allows the mandrel to revolve, but holds it in position as the tube is drawn off. The stationary head or frame *l* is made to receive the pinions or gears *m* that surround the central driving-wheel *n*, the axis of which is hollow, so that the pipe or tube that is operated upon may pass through the same. The power is applied, by preference, to this central wheel *n*; and the loose clutch-couplings or universal joints *r r r* and shafts *s s s* connect the shafts of the respective wheels or pinions *m* with the shaft of the reducing-rollers *c*.

It will now be apparent that the rolling and reducing operation is around the pipe in a line similar to a screw-thread, and that the pitch-line of such screw will depend upon the angle at which the axes of the rollers *c c c* are placed to the tube.

The angle at which the axes of the rollers stand to the tube should not be sufficient to produce ridges or inequalities in the tube in consequence of too rapid movement of the tube endwise of the mandrel.

Bars or rods have been rolled by tapering rollers that diverge from the article operated upon, and also stand at an inclination to a plane passing through the rod, so as to cause such rod to progress gradually through the machine. In my machine, the mandrel, being held in position, but revolving with the tube, sustains the same, and maintains the proper size of bore as the metal is reduced and the tube drawn off.

I claim as my invention—

1. The rollers *c c c*, set in boxes *b b b*, adjustable within the head *a*, and having their

axes at an inclination to the axis of the tube to be operated upon, and revolved by suitable gearing, in combination with the mandrel *g*, held in position by the frame *h*, but allowed to revolve, substantially as set forth.

2. The rollers *c c c* and boxes *b b b*, sustaining the same within the head *a*, with their axes at an inclination to the article to be operated upon, in combination with the station-

ary head *l*, gears *m m m* and *n*, shafts *s*, and universal joints *r*, substantially as and for the purposes set forth.

Signed by me this 4th day of September, 1873.

H. W. HAYDEN.

Witnesses:

GEO. D. WALKER,
HAROLD SERRELL.