

No. 711,442.

Patented Oct. 14, 1902.

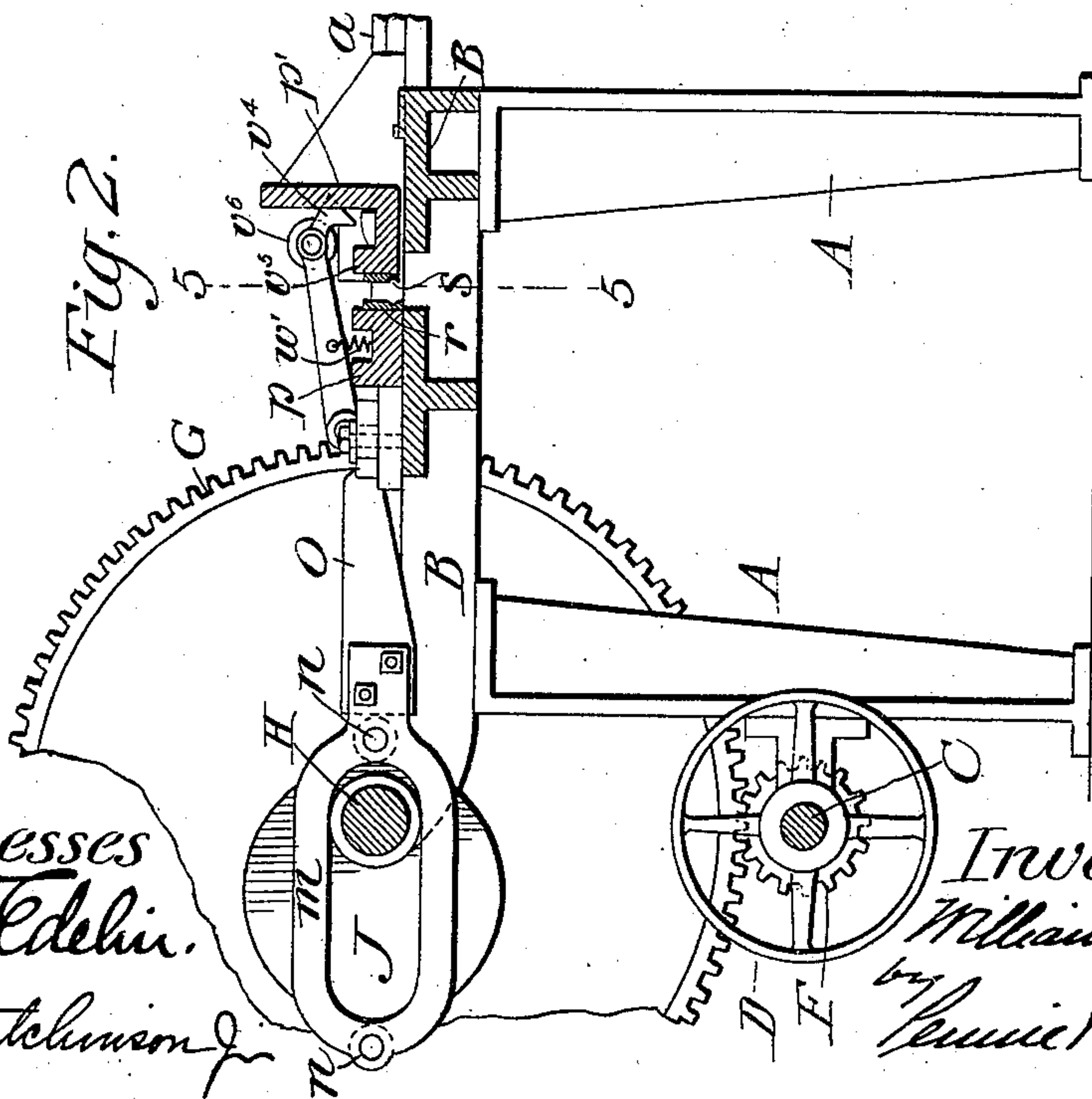
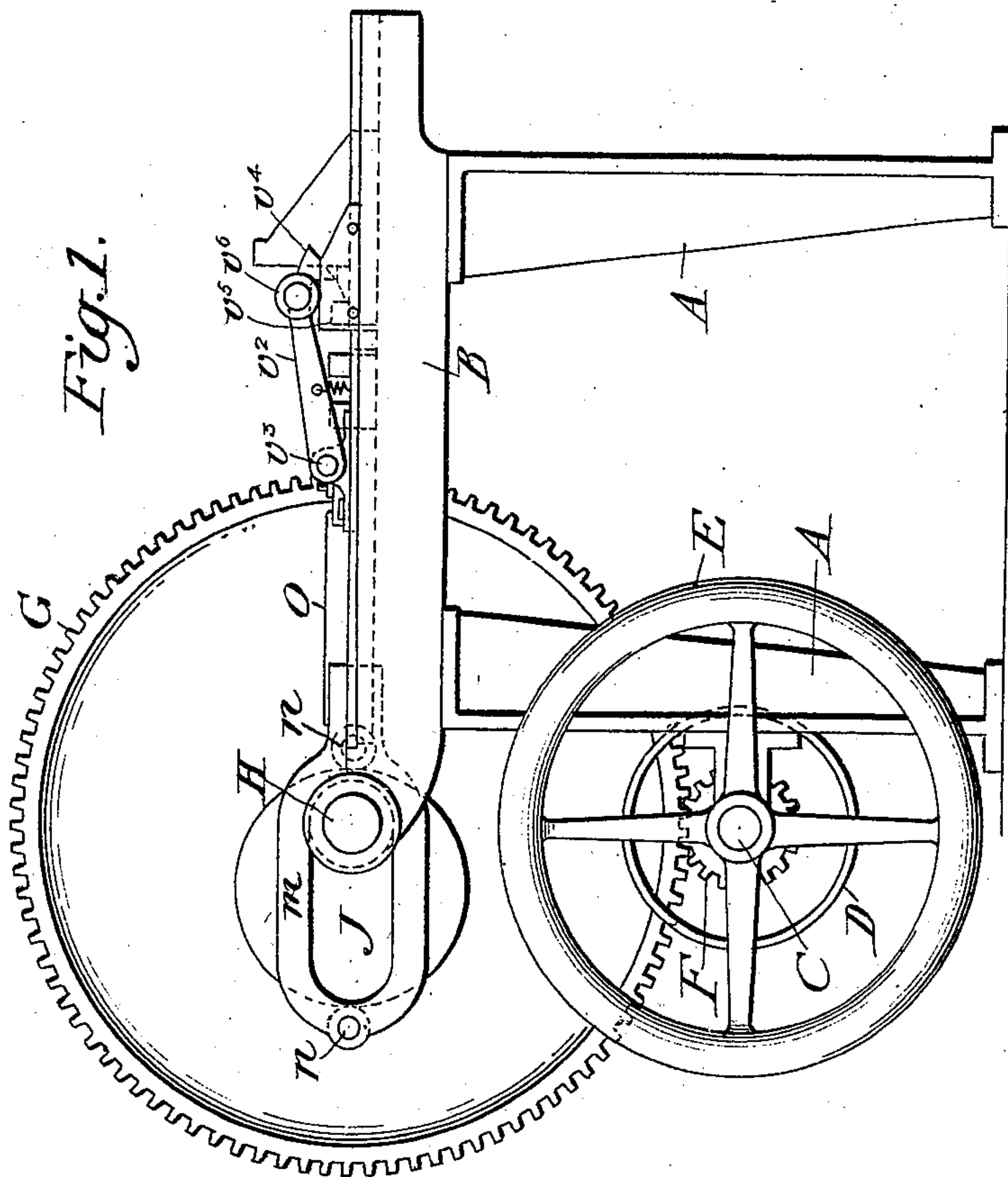
W. S. SEYMOUR.

BLANK FORMING MACHINE FOR TUBES.

(Application filed Mar. 11, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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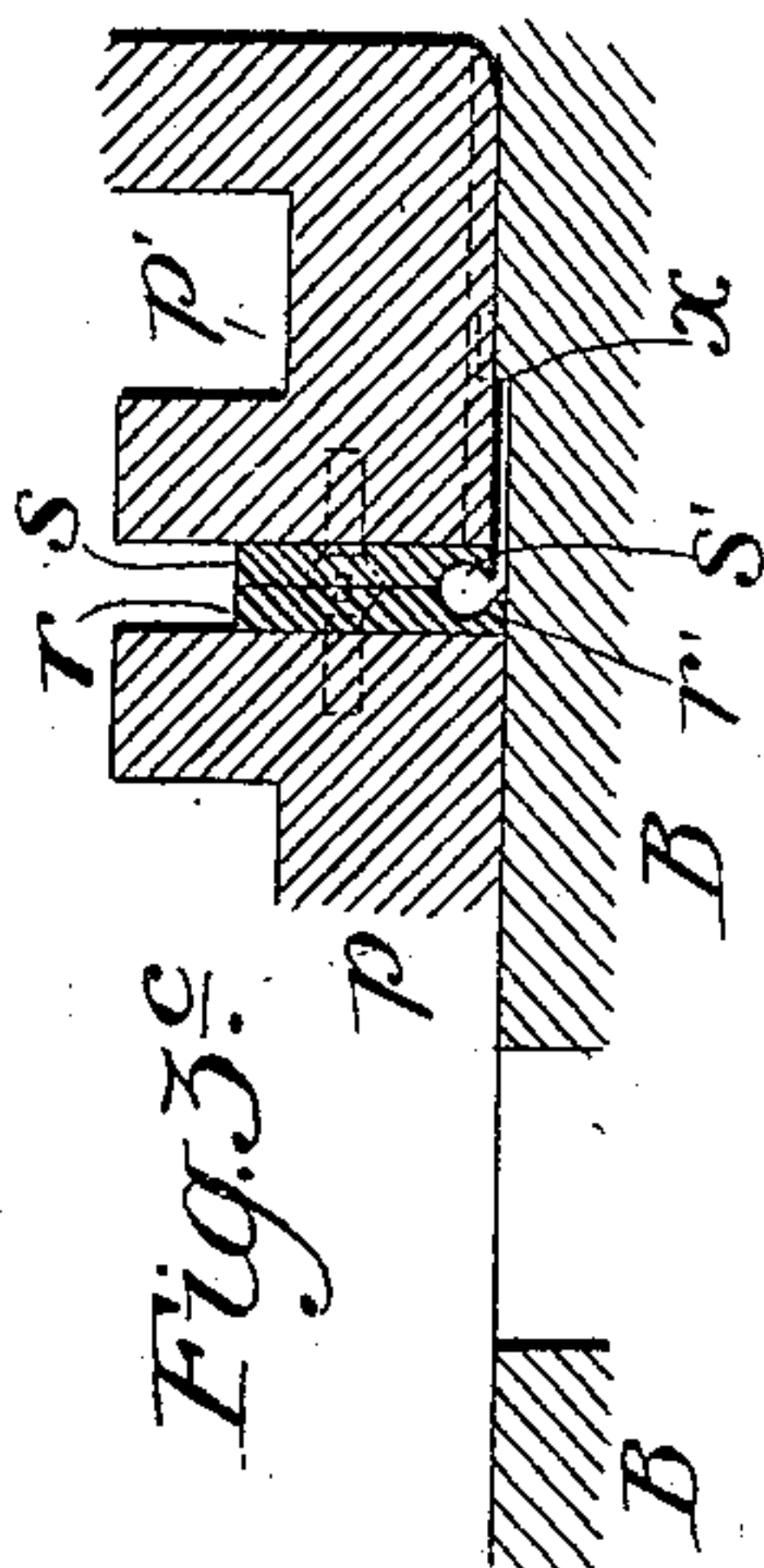
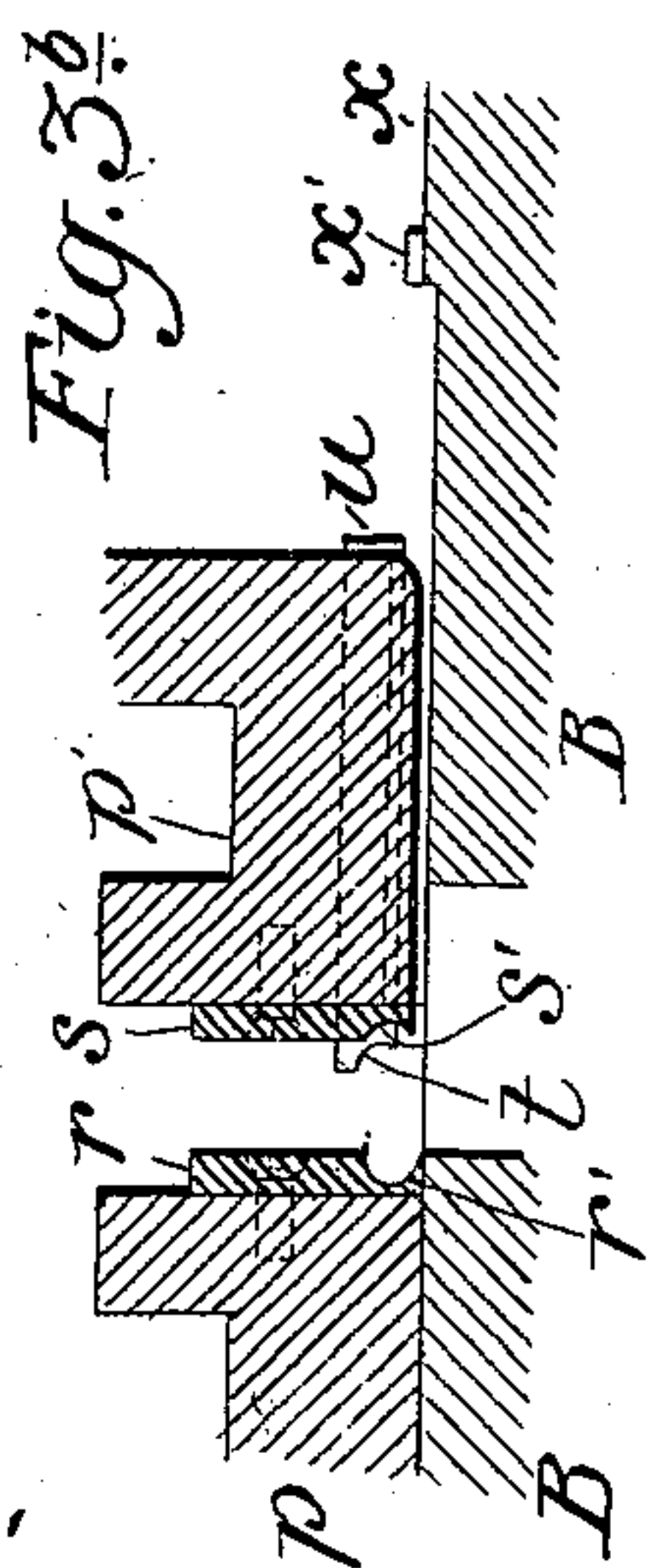
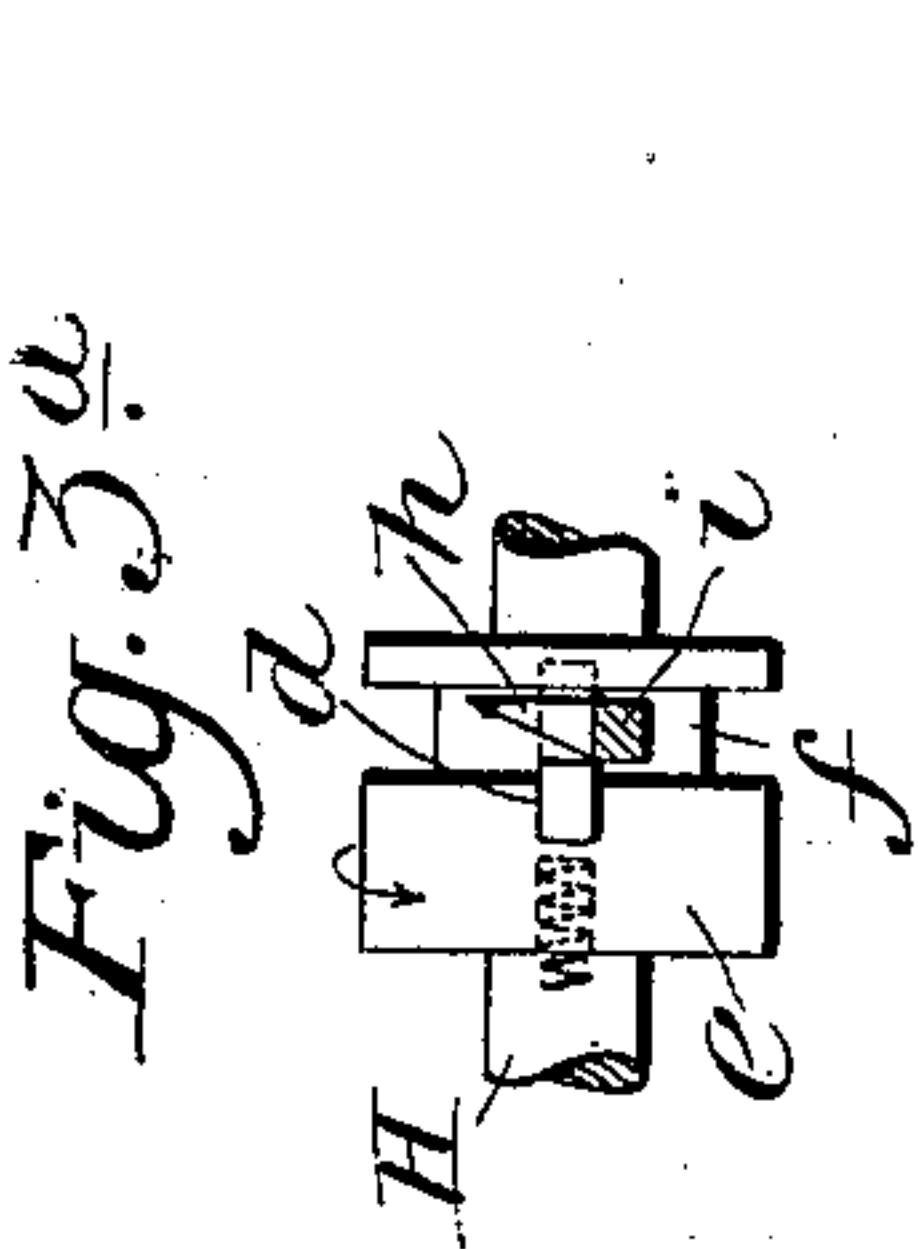
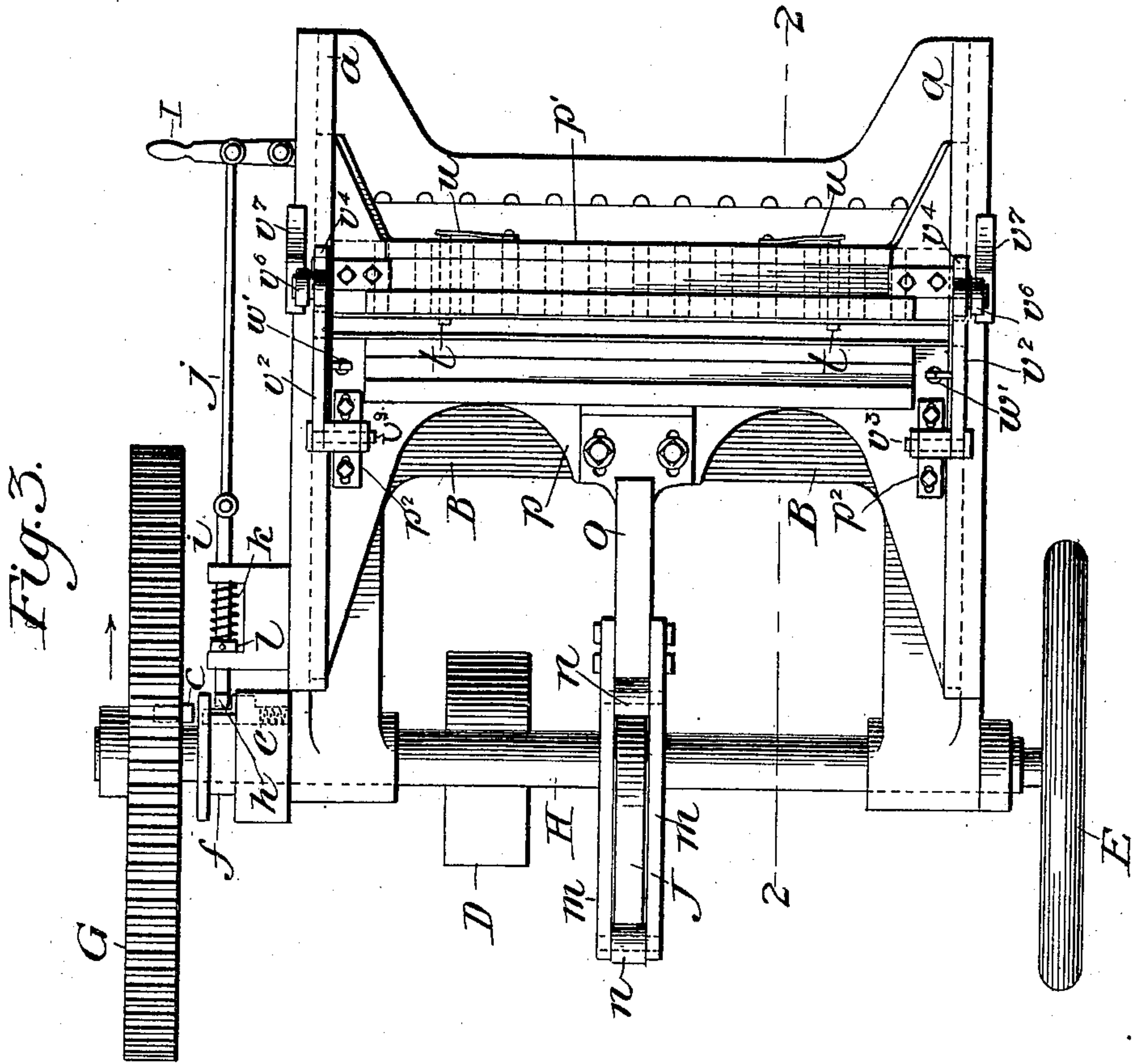
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BLANK FORMING MACHINE FOR TUBES.

(Application filed Mar. 11, 1901.)

(No Model.)

3 Sheets—Sheet 2.



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(No Model.)

3 Sheets—Sheet 3.

Fig. 5.

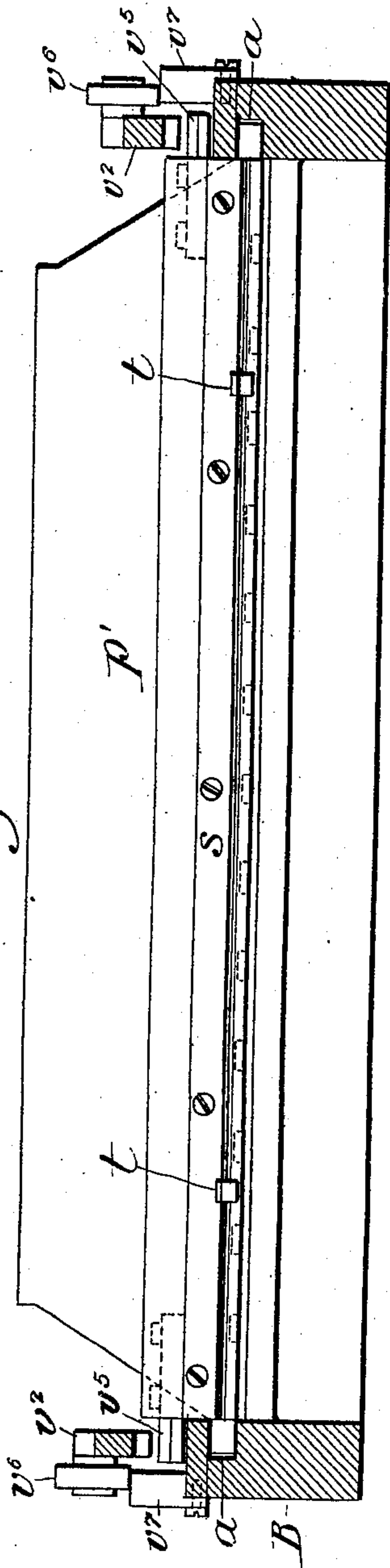


Fig. 6.

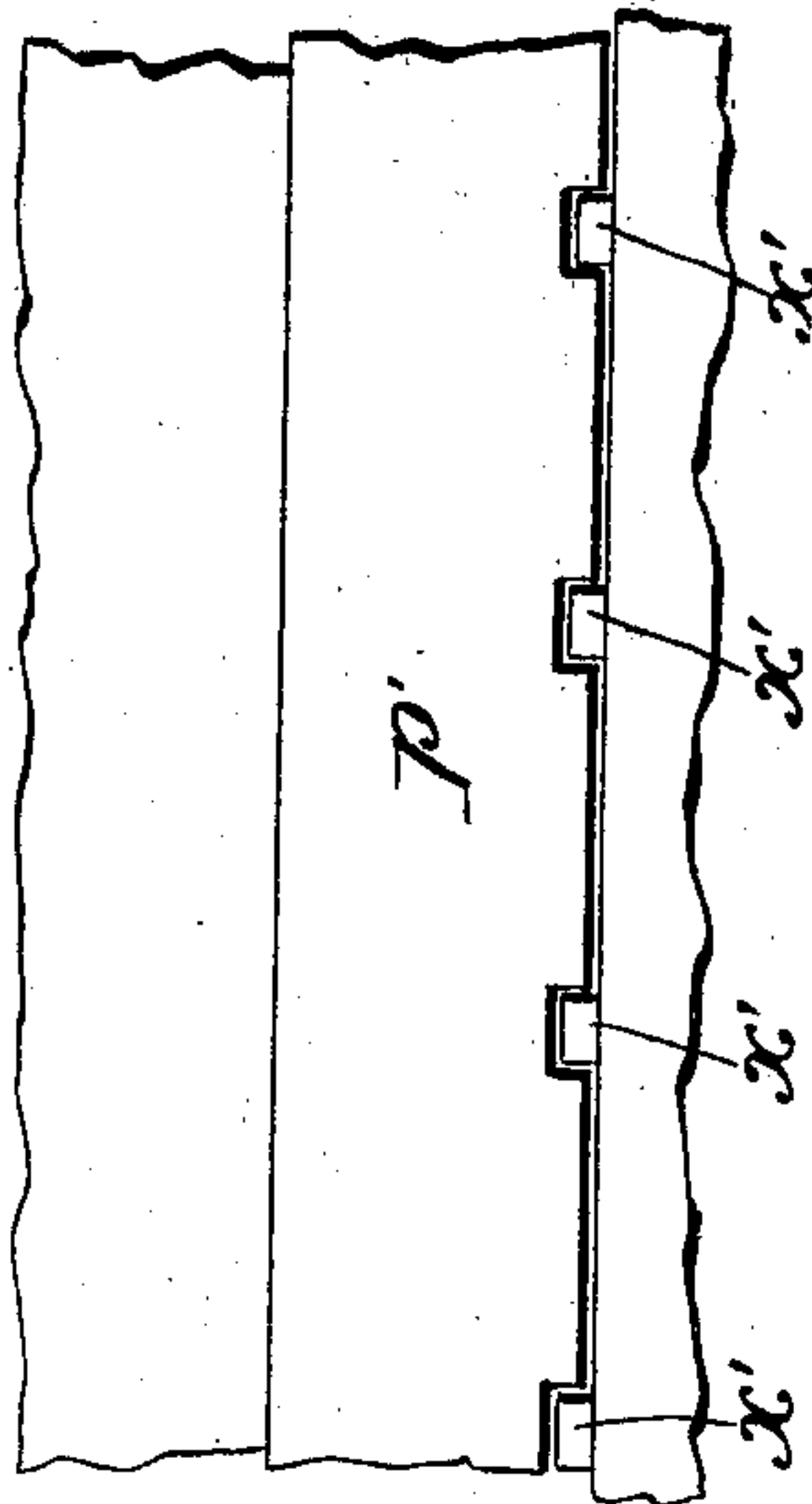


Fig. 4.

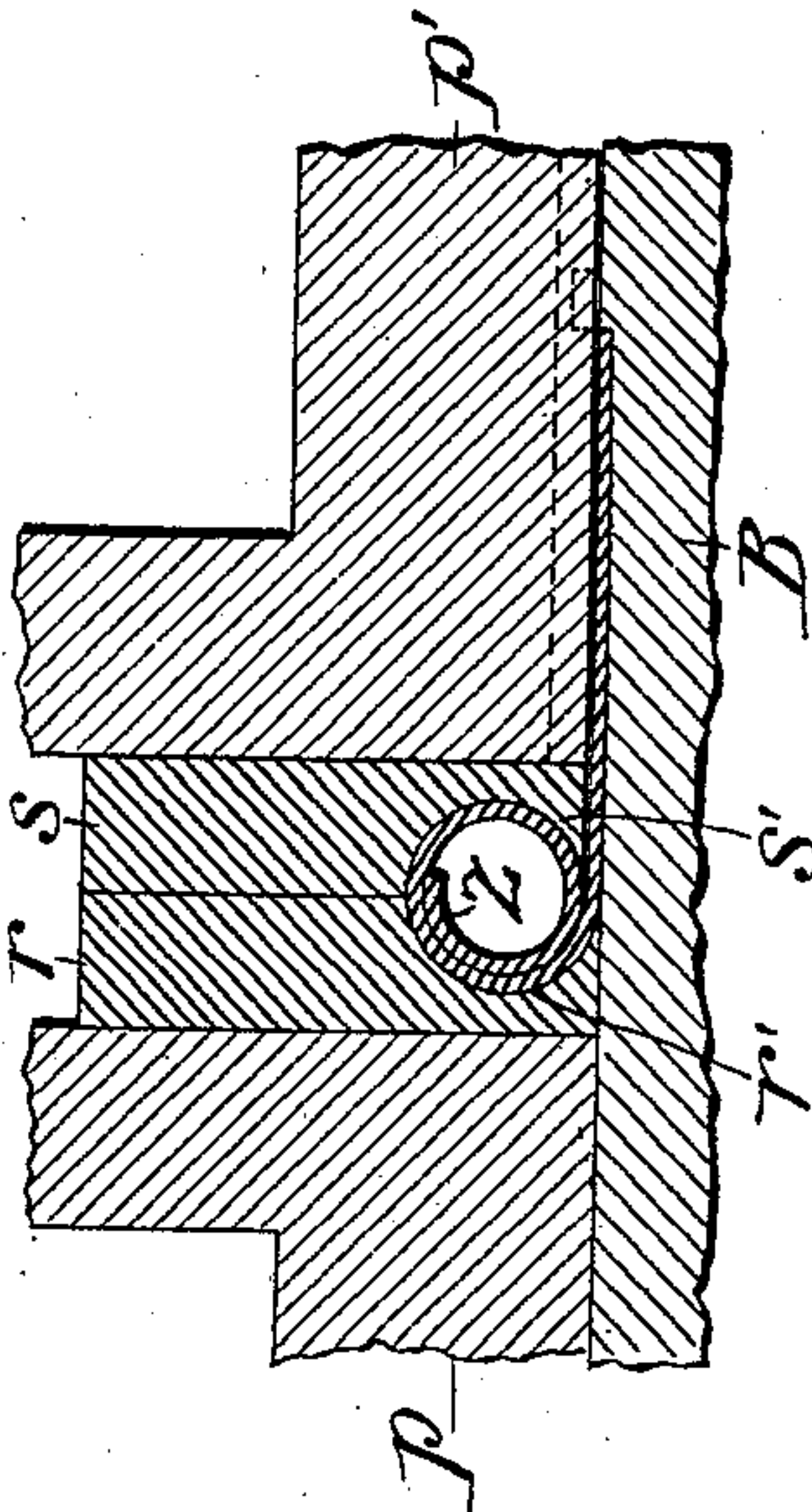
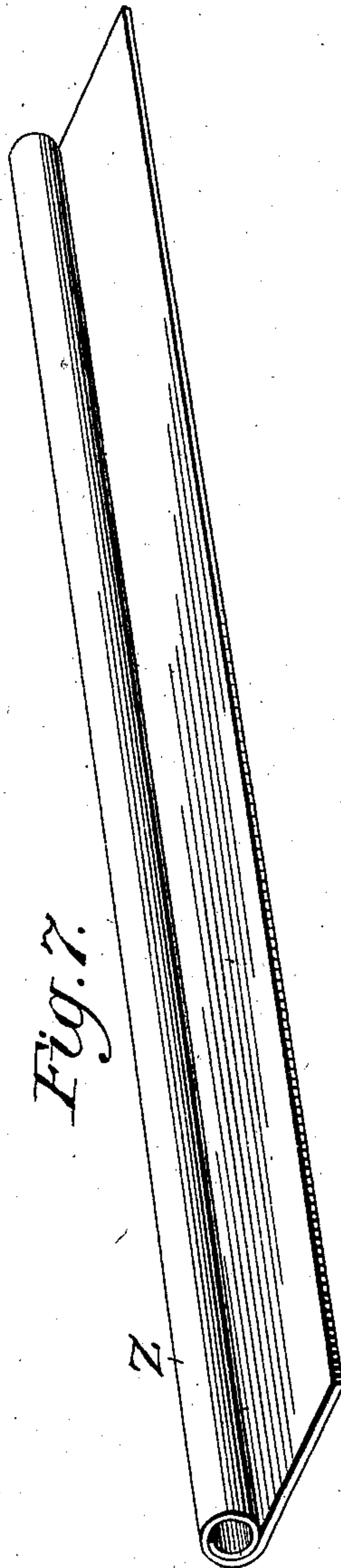


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM S. SEYMOUR, OF PHILADELPHIA, PENNSYLVANIA.

BLANK-FORMING MACHINE FOR TUBES.

SPECIFICATION forming part of Letters Patent No. 711,442, dated October 14, 1902.

Original application filed July 7, 1900, Serial No. 23,928. Divided and this application filed March 11, 1901. Serial No. 50,684. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. SEYMOUR, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Blank-Forming Machines for Tubes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in the manufacture of sheet-metal tubes, and particularly to the production of tubes of relatively small diameter from sheet metal—as, for instance, umbrella-sticks and the like, wherein it is desirable to combine considerable strength and rigidity in the resultant product.

In the practice of my invention I first produce from a flat blank or strip of metal a preliminary structure, consisting of said blank having one of its edges rolled into the form of a cylinder of an internal diameter approximating that of the finished stick or tube. I thereupon introduce this cylindrical edge portion of the blank into the pass of a two-high rolling-mill, wherein while subjecting the blank to a graduated pressure it is rolled into the finished form. The rolls of the mill are geared to rotate in the same direction, so that when the blank is introduced between them their working surfaces act in opposite directions thereon with the resultant effect not only of promptly winding the flat portion of the blank upon the cylindrical edge portion, but also of spinning the sheet metal, so that the number of turns or convolutions of the finished article will be correspondingly increased, thereby adding to its inherent strength and stability. During the rolling operation I insert a mandrel within the tube, so as to oppose the necessary resistance to the crushing action of the rolls.

The present application relates to the apparatus for producing the preliminary structure above referred to and is a division of my application filed July 7, 1900, Serial No. 23,928, which describes and claims the finishing-machine.

In the accompanying drawings, Figure 1 represents in end elevation the apparatus for producing the preliminary blank structure hereinbefore referred to. Fig. 2 represents, partly broken away, a section thereof on a plane indicated by the line 2 2 of Fig. 3. Fig. 3 represents a top plan view of the said apparatus. Fig. 3^a represents, partly in section and partly in elevation, a portion of the clutch mechanism. Figs. 3^b and 3^c represent, respectively, in cross-section different locations in the line of travel of the jaws which coöperate to form the cylindrical edge fold of the blank. Fig. 4 represents, on a somewhat larger scale, the final step of forming said cylindrical fold. Fig. 5 represents a section taken on a plane indicated by the line 5 5 of Fig. 2. Fig. 6 represents a portion thereof on a larger scale. Fig. 7 represents in perspective a view of the preliminary blank structure produced in the apparatus shown in Figs. 1 to 6.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the apparatus shown in Figs. 1 to 6, inclusive, A indicates the standards of a machine-frame supporting a top frame or table B, having guide-grooves *a*, within which the forming or folding dies are adapted to reciprocate. In suitable brackets on the standards A is journaled the power-shaft C, adapted to be driven from the belt-pulley D from any suitable source of power and having a hand-wheel E for adjusting the shaft to the starting position.

Upon the shaft C is mounted the pinion F, which engages with a speed-reducing gear G, as shown. The gear G is loose upon a shaft H, but is adapted to be clutched to said shaft through the intermediacy of a clutch-pin *c*, (see Fig. 3,) whose path of movement crosses the location of a spring-seated pin *d* when said pin is projected from its receiving-socket in the collar *e*, fixed to the shaft H. Within a groove *f* of the collar E is interposed the wedge-shaped end *h* of a stem *i*, coupled by a link *j* to a pivot-operating handle I. A spiral spring *k*, reacting against a collar *l*, fixed to the stem *i*, normally holds the wedge-shaped end *h* within the groove *f*, and there-

by enables the operator to unclutch the shaft H from the gear G when desired and to keep it in the unclutched position when he desires to interrupt the reciprocating of the dies.

5 Upon the shaft H is fixed the rotating eccentric J, flanked on opposite sides by the links *m* and making contact with antifriction-rollers *n*, mounted in said links. To the links *m* is bolted a bar *o*, secured at its opposite
10 end by adjusting bolts and slots, as shown, to the carrying-plate *p* of one of the reciprocating dies *r*. Another slide *p'*, likewise guided by the grooves *a*, carries a die *s*, and both dies *r s* are movable at will. The dies *r s* are
15 provided with the bend-forming recesses *r' s'*, of semicircular curvature, adapted to form a bend of corresponding external diameter. The removability of the dies permits the operator to replace them by others having
20 larger or smaller recesses, as the case may be, when he desires to form a bend of larger or smaller diameter upon the blank.

At opposite ends of the slide *p* are journaled in bearings *p²*, (which are themselves adjustable by means of slots and bolts, as shown,) 25 the rock-pins *v³*, which carry the arms *v²*, normally held down by means of springs *w'* connecting them to the slide. These rock-arms *v²* terminate at their outer ends in hooks
30 *v⁴*, adapted to engage with projections *v⁵* upon the slide *p'*. The rock-arms *v²* are also provided with antifriction-rollers *v⁶*, which ride upon the cam-surfaces *v⁷*, said cam-surfaces being of such configuration that when the
35 rollers *v⁶* are on the upper or level portion of the cams the hooks *v⁴* will be raised out of engagement with the projections *v⁵*.

It will be noted (see particularly Figs. 2, 3, 3^b, and 6) that the lower surface of the slide 40 *p'* and the die *s* is slightly higher than the lower surfaces of the slide *p* and die *r*, this difference in height representing the thickness of the sheet of metal or blank operated upon. The bed-plate B is provided with a
45 ridge *x* in the rear of the slide *p'* when the latter is in its forward position, and along this ridge are located a series of projections *x'*, which are in alinement with corresponding grooves in the under surface of the slide *p'*.
50 The slide *p'* is, furthermore, provided with pins *t'*, which are normally held in a forward position (indicated in Figs. 3 and 3^b) by means of springs *u*.

Figs. 1, 2, 3, and 3^b indicate the location of 55 parts when the apparatus is ready to begin its operation. At that moment the operator inserts a flat sheet-metal blank of the appropriate length and width into the space between the bed-plate B and the slide *p'* and
60 pushes said blank forward until its rear edge clears the ridge *x* and the projections *x'* and its forward edge just enters the groove *r'* of the die *r*. The operator thereupon grasps the handle I and withdraws the wedge-shaped
65 pin *h*, thereby causing the gear G to be clutched to the shaft H. The shaft H accordingly revolves for one revolution until

again thrown out of engagement with the gear H by means of the wedge-shaped pin *h*. In the meantime the cam J causes the slide 70 *p* to advance toward the operator, finally carrying with it the slide *p'*. The edge of the blank within the recesses *r' s'* of the dies *r s* accordingly begins to assume a circular bend or curvature of substantially one and one- 75 half convolutions, as indicated in Figs. 4 and 7. At this period in the advance of the two slides the cam J has reached the limit of its forward throw and the rollers *v⁶* have passed off from the level portion of the 80 cam-surfaces *v⁷* to the base thereof, so that the hooks *v⁴* are lowered to the level of the projections *v⁵* on the slide *p'* and are held in this lower position by the springs *w'*. Accordingly as the slide *p* begins its return 85 movement it first separates the die *r* from the die *s* to an extent indicated in Fig. 3^b, and the spring-seated pins *t* push the bent portion *z* of the blank out of the recess *s'* of the die *s*. Immediately thereafter the hooks *v⁴* 90 come into contact with the projection *v⁵* and carry the slide *p'*, together with the blank, forward until the position indicated in Figs. 1 to 3 and 3^b is reached, whereupon the blank falls through the corresponding aperture in 95 the table B into any suitable receptacle, and the apparatus automatically comes to a standstill by the unclutching of the shaft H from the gear G, as hereinbefore described, preparatory to the feeding-in of a new blank and 100 the repetition of the same operation.

The extent of forward throw of the die *r* is determined by the adjustment of the slot-and-bolt connections between the arm *o* and the slide *p*, and the time at which the hooks *v⁴* 105 shall engage with the projections *v⁵* on the slide *p'* is likewise determined by the adjustment of the slot-and-bolt connections between the bearings *p²* and the slide *p*. These adjustments are of course made in accordance 110 with the particular width of blank operated upon and the particular character of the dies employed in any individual instance. The function of the projections *x'* upon the ridge 115 *x* is to serve as an additional precaution against the receding of the blank while it is being operated upon by the dies, any irregularities in the rear edge of the blank being, moreover, more effectually smoothed down by reason of the corresponding subdivision of 120 the under surface of the slide *p'*.

It will be understood that the further manipulation of the preliminary blank thus formed is carried on in the finishing-machine 125 described in my other application, hereinbefore referred to, or in any similar machine adapted to form the blank into the desired complete tube.

Having thus described my invention, what I claim is—

1. In an apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being

provided with forming-dies reciprocating in the same direction; substantially as described.

2. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with forming-dies, reciprocating in the same direction, said dies having semicircular working surfaces facing each other, slides upon which the dies are mounted, and a bed-plate having a supporting-surface for the blank below one of the slides; substantially as described.

3. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with reciprocating forming-dies, having semicircular working surfaces facing each other, slides upon which the dies are mounted, and a bed-plate having a supporting-surface for the blank below one of the slides, and a transverse discharge-opening; substantially as described.

4. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with reciprocating forming-dies, having semicircular working surfaces facing each other, slides upon which the dies are mounted, and a bed-plate having a supporting-surface for the blank below one of the slides and a ridge or abutment beyond said supporting-surface; substantially as described.

5. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with reciprocating forming-dies, having semicircular working surfaces facing each other, slides upon which the dies are mounted, and a bed-plate having a supporting-surface for the blank below one of the slides, a ridge or abutment beyond said supporting-surface, and additional projections upon the ridge spaced apart and in alinement with corresponding grooves or recesses in the under surface of the proximate slide; substantially as described.

6. In apparatus for making tubes from

sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with reciprocating forming-dies, one of said dies being provided with spring-seated bars for expelling the bent portion of the blank therefrom when the two dies separate; substantially as described.

7. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with reciprocating forming-dies, said dies being normally spaced apart at the beginning of the operation, and means for coupling them together as the one die on its return movement tends to recede from the other; substantially as described.

8. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with reciprocating forming-dies, said dies being normally spaced apart at the beginning of the operation, and means for coupling them together as the one die on its return movement tends to recede from the other, said means consisting of pivoted arms attached to the one die and terminating at their ends in hooks, projections on the other die adapted to engage with said hooked ends, and cams for guiding the hooked ends into and out of engagement with said projections; substantially as described.

9. In apparatus for making tubes from sheet-metal blanks, a preliminary machine for giving an initial convolution to the blank along one edge thereof, said machine being provided with forming-dies reciprocating in the same direction, the reciprocating means consisting of a shaft, eccentric and eccentric-rod, driving-gear for said shaft, and an automatic clutch for throwing the driving-gear out of engagement with the shaft at the termination of each revolution; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM S. SEYMOUR.

Witnesses:

GEO. H. RAPSON,
H. C. SEELY.