

No. 752,980.

PATENTED FEB. 23, 1904.

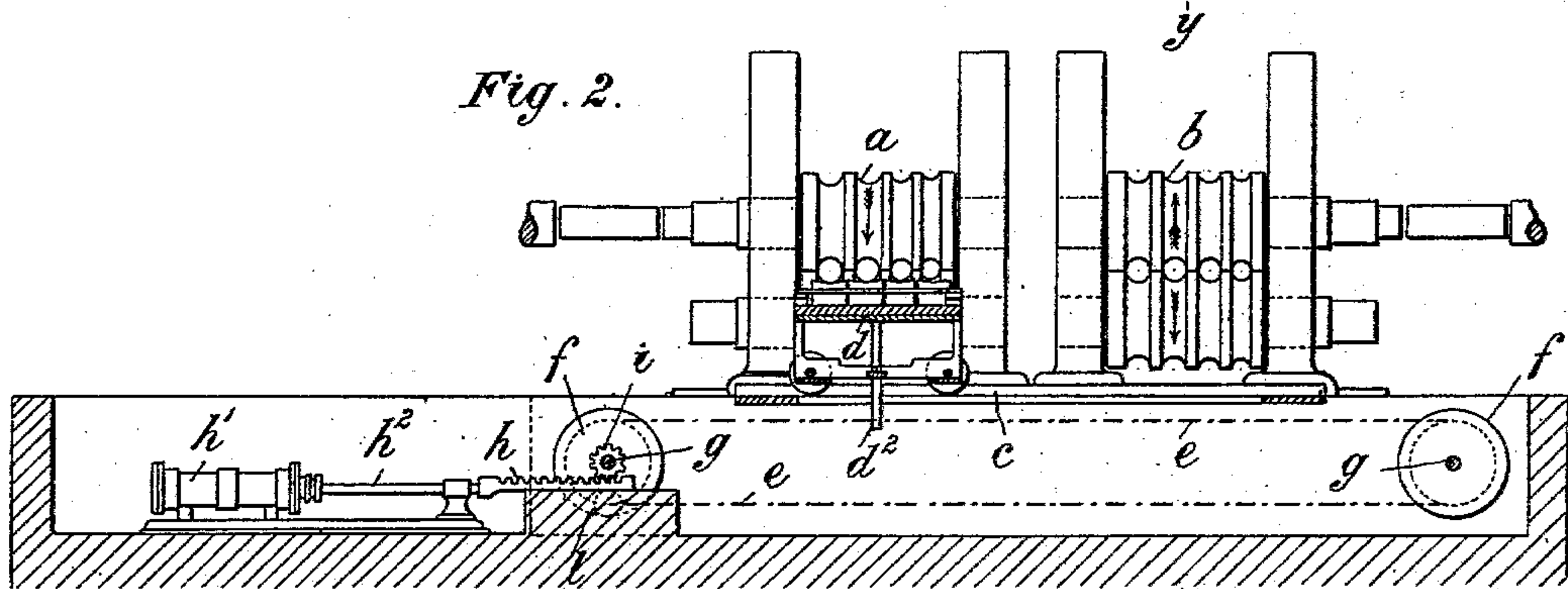
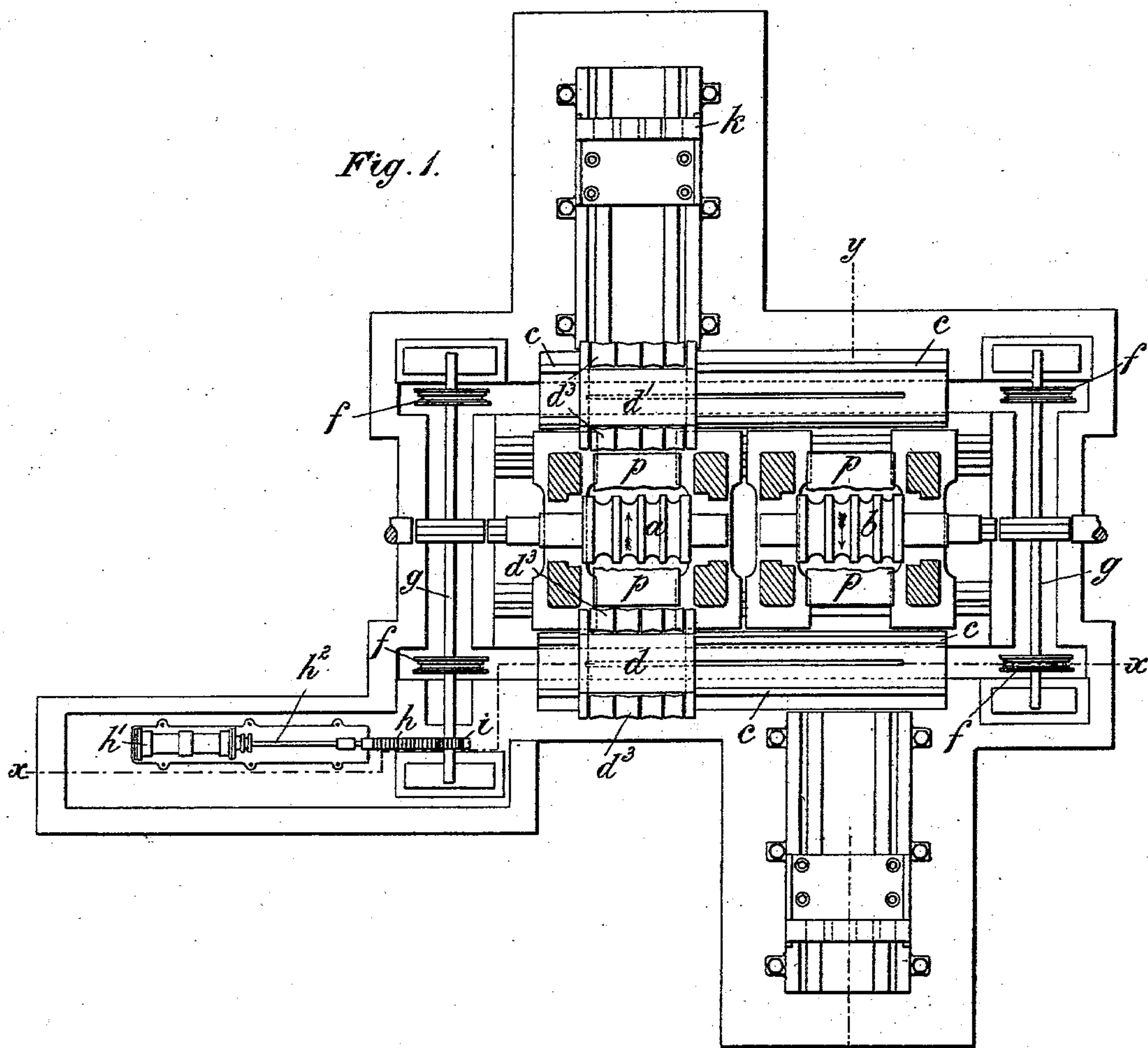
W. U. JACKSON & F. H. LLOYD.

MACHINERY FOR THE MANUFACTURE OF METALLIC TUBES, &c.

APPLICATION FILED JULY 27, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses;—

*Richard Bennett*

*Arthur John Powell*

Inventors;—

*William Upchurch Jackson*

*Francis Henry Lloyd*

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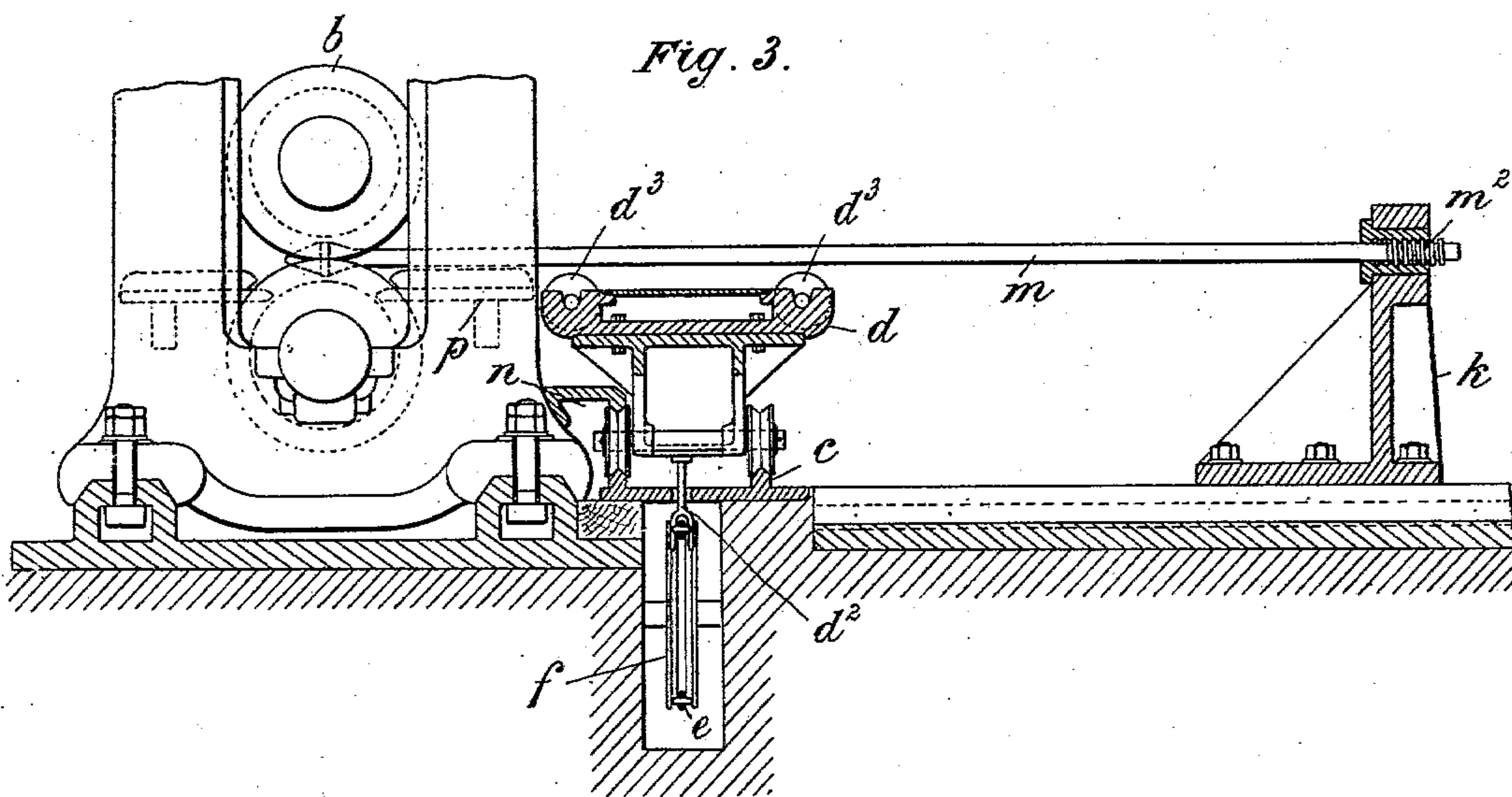
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Richard Kerrett  
Arthur John Powell

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Francis Henry Lloyd.



# UNITED STATES PATENT OFFICE.

WILLIAM UPRICHARD JACKSON, OF HEATH TOWN, AND FRANCIS HENRY LLOYD, OF LICHFIELD, ENGLAND.

## MACHINERY FOR THE MANUFACTURE OF METALLIC TUBES, &c.

SPECIFICATION forming part of Letters Patent No. 752,980, dated February 23, 1904.

Application filed July 27, 1903. Serial No. 167,243. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM UPRICHARD JACKSON, residing at Bickford House, Heath Town, and FRANCIS HENRY LLOYD, residing at Stowe Hill, Lichfield, Staffordshire, England, subjects of the King of Great Britain, have invented certain new and useful Improvements in Machinery for the Manufacture of Steel and other Metallic Tubes and Tubular Billets and other Articles, of which the following is a specification.

Our invention consists of the improvements hereinafter described in machinery for the manufacture of steel and other metallic tubes and tubular billets and other articles, such as shells from tubular ingots or blooms, by the use of which improved machinery the manufacture of the said articles is facilitated and economized.

Instead of manufacturing tubular billets and tubes from tubular ingots or blooms by passing them through a series of holes in the same set of grooved rolls we employ, according to our invention, two pairs or sets of grooved rolls arranged end to end, one pair of rolls rotating in an opposite direction to the other pair—that is, one pair of rolls is so rotated as to carry the ingot through the rolls in a forward direction and the other pair of rolls to carry it back through the second pair in the opposite direction. Each pair of rolls is furnished with two or more holes or grooves, as may be required, and the adjacent axes of both pairs of rolls may be arranged to rotate in the same middle housing. At the delivery side of the first pair of rolls is a back stay or stop supporting a mandrel, (or mandrels,) the bulb or head of the mandrel occupying the eye of the grooves of the said first pair of rolls, and the delivery or opposite side of the second pair of rolls is provided with a similar back stay or stop and mandrel for use with the said second pair of rolls. The delivery side of each pair of rolls is provided with a receiving table or carrier which is capable of an automatic sliding or endless motion for transferring the rolled billet or tube delivered onto it from opposite the hole or eye in the first pair of rolls to opposite the desired hole or eye in the sec-

ond pair of rolls and back from the hole or eye in the said second pair of rolls to opposite the hole or eye and mandrel in the first pair.

Figure 1 of the accompanying drawings represents in sectional plan tube-rolling machinery constructed according to our invention. Fig. 2 is a vertical section of the same, taken on the dotted line *x x*, Fig. 1. Fig. 3 is a vertical section of a portion of the said machinery, the said section being taken on the dotted line *y y*, Fig. 1. Fig. 3 is drawn to a larger scale than Figs. 1 and 2.

The same letters of reference indicate the same parts in the several figures of the drawings.

*a a* represent one pair of rolls, and *b b* represent the other pair, the said two pairs of rolls being arranged end to end and being independently driven, so as to rotate in opposite directions, as is indicated by the arrows on the rolls in Figs. 1 and 2. Arranged at opposite sides of the pairs of rolls are railed tracks or ways *c c*, on which tables *d d'* are placed, so as to be capable of traveling from opposite one pair of rolls to opposite the other pair. The two longitudinal edges of each table are provided with a series of slightly concave anti-friction-rollers *d''*.

The spaces between the inner longitudinal edges of the traveling tables *d d'* and the eyes of the rolls *a a* and *b b* are bridged or occupied by fixed platforms or tables *p p*, (indicated in dotted lines in Fig. 3,) secured between the housing of the rolls. Each traveling table has on its under side a depending rod *d''*, which is connected to an endless chain *e*, working over pairs of underground chain wheels or pulleys *f f*. The pairs of driven chain wheels or pulleys *f* are fixed or keyed to the shafts *g*, so that the tables *d d'*, which are arranged opposite each other, travel backward and forward together on their respective tracks *c c*. The first or driven shaft *g* is rotated in a backward and forward direction by a rack *h*, gearing with a pinion *i* on the first or driven shaft *g*, the said rack *h* being reciprocated by the piston-rod *h'* of the steam-cylinder *h'*. The rack *h* is preserved in gear with the pinion *i* by a roller *l*, on which the under side



of the rack bears. When the lever or handle of the steam-admission valve of the cylinder  $h'$  (which valve and its handle are not shown) is turned in one direction, steam enters one end of the cylinder and causes the piston-rod  $h^2$  and rack  $h$  to advance in one direction, and thereby transmit motion to the chain-pulleys  $f f$  and endless chains  $e e$  through the pinion  $i$  and shafts  $g$ . As the tables  $d d'$  are connected to the endless chains  $e e$  through their depending rods  $d^2$ , which pass through and work in longitudinal slots in the tracks  $c c$ , it will be understood that the tables on the motion of the chains  $e e$  travel on the tracks  $c c$ . By reversing the handle or lever of the steam-admission valve of the steam-cylinder  $h'$  the motion of the traveling tables  $d d'$  may be reversed.

At the delivery side of each pair of rolls is arranged a back stay or stop  $k$ , having holes in its upper edge, as is usual, for receiving the stem of the mandrel  $m$ , (shown only in Fig. 3,) which mandrel-stem is provided with the ordinary loose bulb or head, which is made to occupy the eye of the grooves, through which the ingot, billet, or partly-made tube is to be passed by the adjustment of its back supporting-screw  $m^2$ . (See Fig. 3.)

The machinery described is used in the following manner: The traveling tables  $d d'$  being in the positions represented in Fig. 1, the hollow ingot or bloom in a heated state is passed through the pair of rolls  $a a$  and is delivered onto the stem of the mandrel  $m$ . The mandrel  $m$  being withdrawn in the ordinary way, the partly-rolled ingot, billet, or bloom rests on the table  $d'$  at the back or delivery side of the rolls  $a a$ . In order to prevent the tilting of the traveling tables  $d d'$ , should the ingot, billet, or bloom resting thereon overhang the outer side or edge of the table on which it is supported, rails  $n$  (see Fig. 3) are arranged to bear on the upper sides of the wheels at the inner sides of the traveling tables  $d d'$ . The steam-admission valve of the cylinder  $h'$  is now operated, and steam is admitted to that end of the cylinder, which will cause the piston  $h^2$  and rack  $h$  to move in the direction proper for transferring the tables  $d d'$  through the pinion  $i$ , chain-pulleys  $f f$ , endless chains  $e e$ , and depending arms or rods  $d^2 d^2$  to opposite the required or next diminishing grooves in the pair of rolls  $b b$  which are rotating in the opposite direction to that of the rolls  $a a$ , as is indicated by the arrows on the rolls in Figs. 1 and 2. The partly-rolled billet or tube is then passed through

the eye of the grooves in the rolls  $b b$  onto the stem of the mandrel  $m$ , supported by the back-stop  $k$  at the delivery side of the rolls  $b b$ , and on the withdrawal of the mandrel in the ordinary way the partly-rolled billet or tube is received on the table  $d'$  at the delivery side of the rolls  $b b$ . By reversing the handle or lever of the steam-admission valve of the cylinder  $h'$  the partly-rolled billet or tube is transferred by motion of the table  $d'$  from the back of the rolls  $b b$  to the front of the rolls  $a a$ , the said table being brought to rest when the partly-rolled billet or tube is opposite or in line with the eye of the rolls through which it is next desired to pass the same. The said partly-rolled billet or tube is then passed through the rolls  $a a$ , and on the withdrawal of the mandrel on which it is received from the rolls it is supported on the table  $d'$  and is ready to be transferred to the rolls  $b b$ , and in the way described the cycle of rolling operations is continued until the tubular billet or tube has been rolled to the required internal and external diameter. It will be understood that when at any of the passes the internal diameter of the billet or tube is required to be changed the bulb or head fitted to the mandrel must have an external diameter equal or approximately equal to the internal diameter which it is desired the billet or tube shall have after that pass.

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

The combination of two pairs of rolls, and a mandrel operative in connection with each pair of rolls, the said pairs of rolls being arranged end to end and being rotative in opposite directions, each pair of rolls having a series of gradually-diminishing eyes or grooves, the eyes or grooves of one pair of rolls alternating in size with the eyes or grooves of the other pair, thereby to permit a series or cycle of rolling operations to be conducted by the two pairs of rolls on a tube or billet to be treated thereby, combined with a pair of traveling tables, one at each side of the rolls, the tables being arranged to travel backward and forward simultaneously.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

WILLIAM UPRICHARD JACKSON.

FRANCIS HENRY LLOYD.

Witnesses:

RICHARD SKERRETT,

ARTHUR JOHN POWELL.