

(No Model.)

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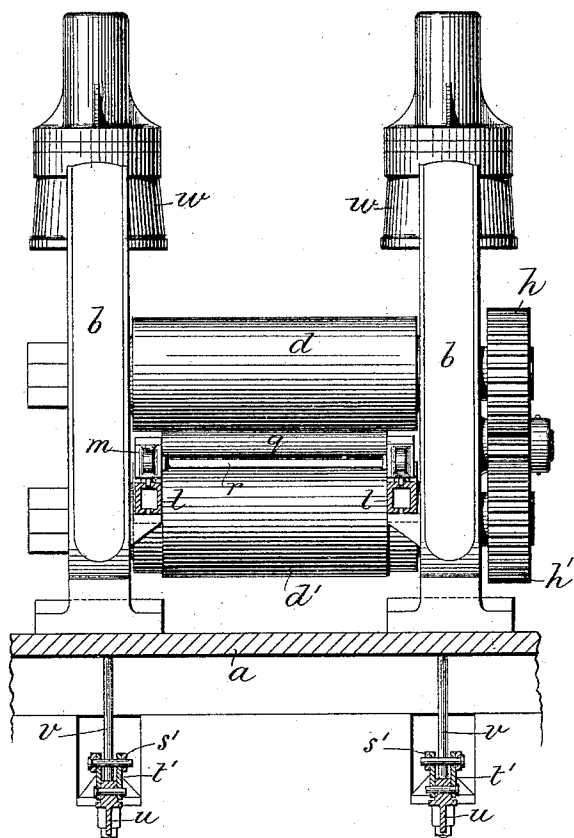
T. C. BARRACLOUGH.

MACHINERY FOR ROLLING AND EXPANDING METAL TUBES.

No. 473,651.

Patented Apr. 26, 1892.

Fig. 1.



WITNESSES:

*Fred White*

*C. K. Fraser*

INVENTOR:

*Thomas Critchley Barracough*

*By his Attorneys:*

*Arthur C. Fraser & Co.*

(No Model.)

3 Sheets—Sheet 2.

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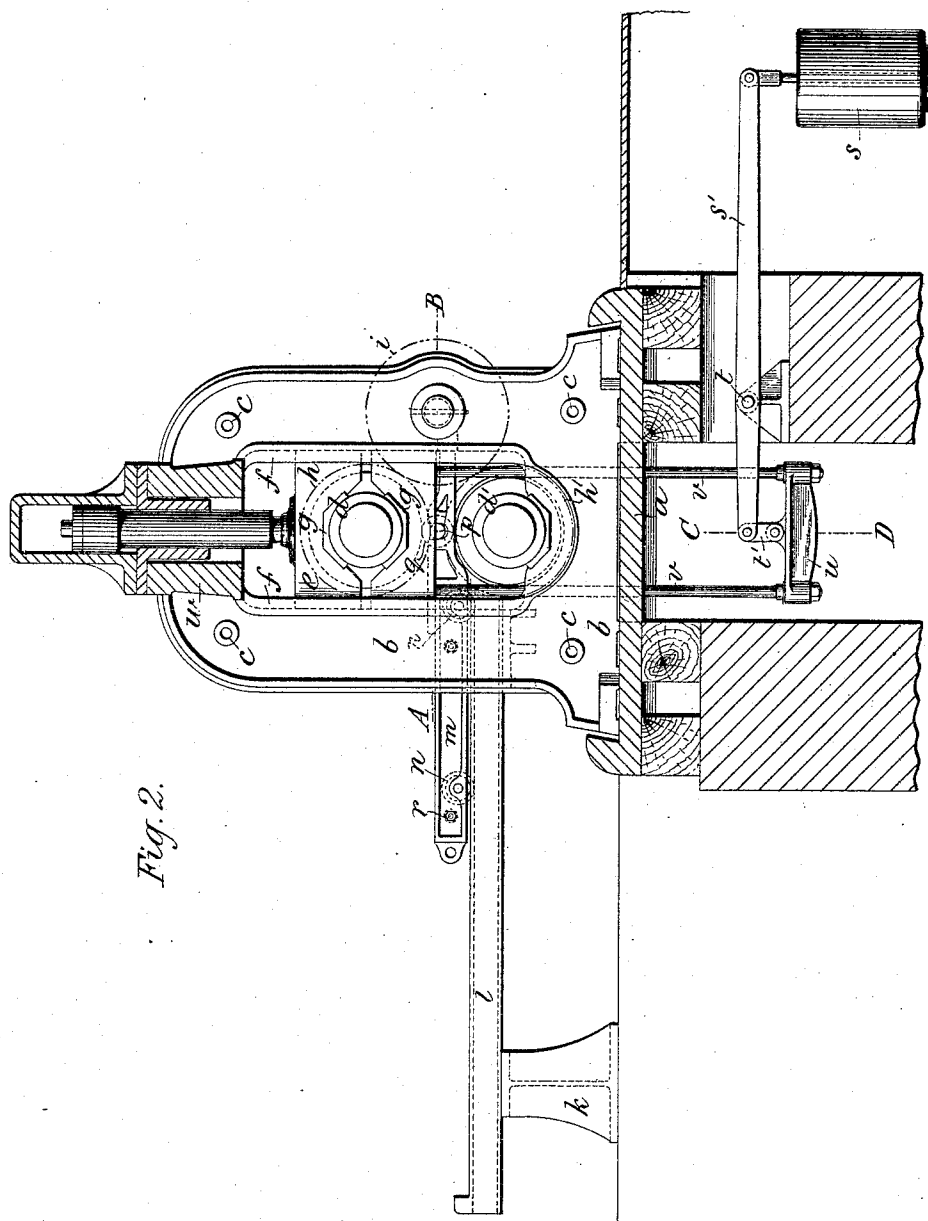


Fig. 2.

WITNESSES:

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INVENTOR:

*Thomas Critchley Barracough,*

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*Arthur G. Fraser & Co.*

(No Model.)

3 Sheets—Sheet 3.

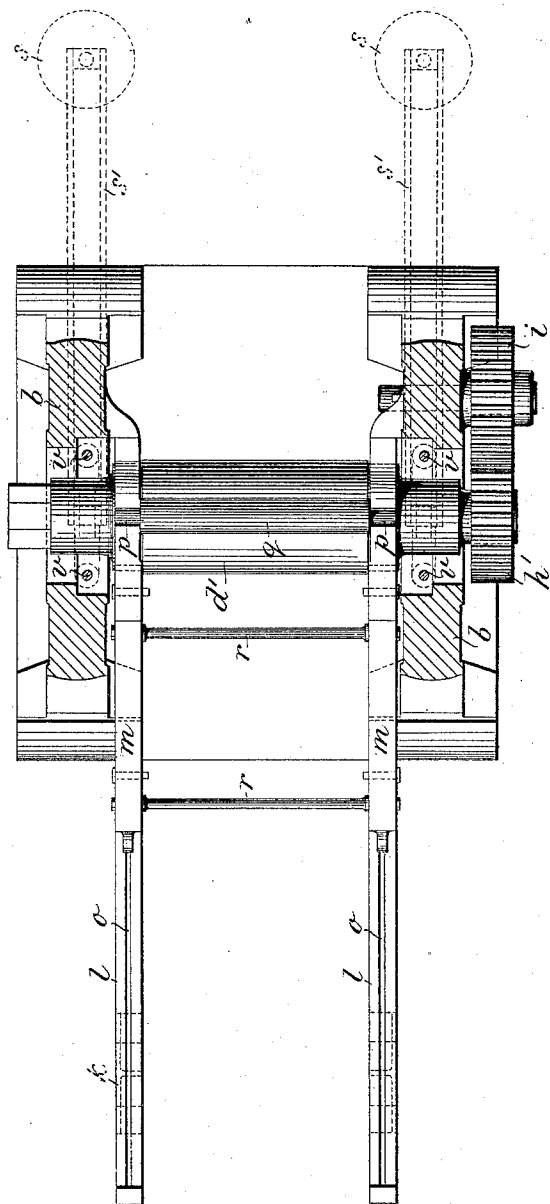
T. C. BARRACLOUGH.

MACHINERY FOR ROLLING AND EXPANDING METAL TUBES.

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Patented Apr. 26, 1892.

Fig. 3.



WITNESSES:

*Fred White*  
*L. K. Fraser.*

INVENTOR:

*Thomas Crichtley Barraclough,*

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# UNITED STATES PATENT OFFICE.

THOMAS CRITCHLEY BARRACLOUGH, OF LONDON, ENGLAND.

## MACHINERY FOR ROLLING AND EXPANDING METAL TUBES.

SPECIFICATION forming part of Letters Patent No. 473,651, dated April 26, 1892.

Application filed May 11, 1891. Serial No. 392,254. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS CRITCHLEY BARRACLOUGH, of London, England, have invented certain new and useful Improvements in Machinery for Rolling and Expanding Metal Tubes, of which the following is a specification.

My invention has reference to machinery for rolling and expanding metal tubes, and more particularly for rolling and expanding tubes which have been formed with internal ribs by means of a mandrel from a hollow ingot or weldless tube or from a welded tube, with the object of being subsequently treated so as to produce seamless or weldless bodies for barrels or other similar vessels.

My invention in its preferred form consists in the combination, with a lower roller or roll mounted in fixed bearings, an upper roller or roll driven in the same direction as said lower roller, movable bearings in which said upper roller is mounted and which are normally kept down by powerful pressure, vertical guideways for said movable bearings, means for driving said rollers in the same direction, and means for forcing said movable roller toward said fixed roller, and a counterpoise adapted to lift said upper roller and its bearings when the downward pressure thereon is removed, of a mandrel for carrying the tube to be operated upon adapted to enter between said rollers and a mandrel and tube carriage revolvably supporting said mandrel and adapted to run said mandrel with the tube to be operated upon sidewise into position between said lower and upper rollers when the upper roller is lifted by said counterpoise and to maintain it in position during the rolling operation and while said upper roller is kept down by powerful pressure and to withdraw it from position when said pressure is removed and said counterpoise again lifts said upper roller, said counterpoise constructed to permit the free operation of said mandrel and tube carriage sidewise toward and from said rollers.

If the tube to be rolled and expanded has internal ribs, it will generally have been produced by inserting into a hollow ingot or weldless tube or a welded tube when heated a round mandrel of steel or other suitable

metal having circular grooves corresponding with the ribs to be produced and then passing the ingot or tube with its mandrel several times through a set of suitable rolls, such as are used for rolling round steel bars; but this preliminary operation and the machinery for effecting it form no part of my present invention, as I can operate by means of my machine upon a tube placed on a mandrel of corresponding size and form no matter how the tube may have been produced.

In the accompanying drawings, Figure 1 is a front elevation, partly in section, on the line C D of Fig. 2, and the rails *ll* being also in section, of a machine constructed according to my invention. Fig. 2 is a side elevation, one of the hydraulic cylinders being shown in mid-section. Fig. 3 is a sectional plan on line A B of Fig. 2.

*a* is a bed-plate.

*b b* are two main housings fixed on said bed-plate and held together by cross-stays *c c*.

*d d'* are two rollers of chilled cast-iron, steel, or other suitable material placed one above the other in a true vertical line between the housings *b b*. The lower roller *d'* has its necks or journals in fixed bearings formed in the lower portion of the two housings *b b*, while the necks or journals of the upper roller *d* are in bearing-blocks *e*, which can rise and fall in guideways *f* in the housings. These blocks *e* are preferably made in two parts, as shown, so as to take up the wear of the brasses *g*. The driving-power is connected to the lower roller *d'*, and is transmitted to the upper roller *d* by gearing so arranged as to cause the two rollers *d d'* to revolve in the same direction. This revolving of the two rollers in the same direction is necessary in order to produce the required expansion of the tube. The gearing shown in the drawings consists of a toothed wheel *h'* on the shaft of the roller *d'*, a toothed wheel *h* on the shaft of the roller *d*, and an intermediate wheel *i*, gearing with both the wheels *h'* and *h* and transmitting motion from the one to the other. It is obvious that any other suitable arrangement of gearing may be substituted for that shown, provided the rollers *d d'* are driven in the same direction.

The round mandrel (marked *q*) having the

tube to be operated upon outside it and in the state in which it left the bar-rolling mill is placed in open-top bearings *p* of a carriage *m*, mounted on rails *l l*, which are supported partly by the housings *b b* and partly by standards *k*. The carriage *m* is then run forward until the mandrel *q* and tube are exactly between the top and bottom rollers *d d'*, a stop or catch insuring that the carriage shall be pushed only so far as will bring the mandrel and tube exactly into position.

To allow the mandrel and tube to enter between the rollers, the upper roller *d* is counterpoised, so that it is forced up, except when downward pressure is applied, as hereinafter described. This counterpoising in the preferred arrangement, which is that illustrated in the drawings, is effected by weights *s* on the ends of levers *s'*, one at each side of the machine. These levers are fulcrumed at *t*, and their other ends are connected by links *t'* to lifting-plates *u*, from which vertical rods *v v* rise to the bearing-blocks *e* of the upper roller. The downward pressure above referred to is obtained from hydraulic cylinders *w w* on the top of the housings *b b*, this pressure when applied overcoming that of the counter-weights. When the machine is in motion, this pressure is applied to the upper roller *d* and the tube on the mandrel begins to gradually expand or increase in sectional area by bulging out at the sides of the mandrel, and at the same time it becomes reduced in thickness. It is obvious that other power—such as that of screws—can be employed in lieu of hydraulic power, as described, for exerting downward pressure on the bearing-blocks *e*.

Although it is preferred that the upper roller *d* should be the roller mounted in movable bearings, it is obvious that the lower roller *d'* may be mounted in movable bearings, in which case the bearings of the upper roller will be fixed. The vertical guideways *f* will then be adapted to the lower roller *d'* and the hydraulic or other power for exerting the necessary pressure will be arranged below the lower roller, so as to act upon this roller and force it toward the upper roller *d*. The counterpoise will be unnecessary, as the lower roller will descend of its own weight when the hydraulic pressure is removed.

When the tube has thus been sufficiently expanded, it is withdrawn, together with the mandrel, from the machine. The mandrel can then be readily removed from the tube, and the latter can, if required and after having been heated in a furnace, be submitted to the action of a machine (such as that forming the subject of another application for patent filed by me May 11, 1891, Serial No. 392,253) for giving it the form of a barrel-body with or without a swell or belly.

If desired, the tubes may be heated in any known manner during the rolling and expanding process.

What I claim, and desire to secure by Letters Patent, is—

1. In machinery for rolling and expanding metal tubes, the combination, with a roller or roll mounted in fixed bearings, a roller or roll driven in the same direction as the first-named roller and mounted in movable bearings, said movable bearings being fitted in vertical guideways and normally forced toward said fixed bearings by powerful pressure, means for driving said rollers in the same direction, and means for forcing said movable roller toward said fixed roller, of a mandrel for carrying the tube to be operated upon adapted to enter between said rollers, a mandrel and tube carriage revolvably supporting said mandrel and adapted to run said mandrel with the tube to be operated upon sidewise into position between said lower and upper rollers, substantially as set forth.

2. In machinery for rolling and expanding metal tubes, the combination, with a roller or roll mounted in fixed bearings, a roller or roll driven in the same direction as the first-named roller and mounted in movable bearings, said movable bearings being fitted in vertical guideways and normally forced toward said fixed bearings by powerful pressure, means for driving said rollers in the same direction, and means for forcing said movable roller toward said fixed roller, of a mandrel for carrying the tube to be operated upon adapted to enter between said rollers, a mandrel and tube carriage revolvably supporting said mandrel and adapted to run said mandrel with the tube to be operated upon into position between said lower and upper rollers and to maintain said mandrel there in position during the rolling operation, and a counterpoise arranged to lift said upper roller and its bearings when said pressure is removed to permit insertion and withdrawal of said mandrel and tube, substantially as and for the purpose set forth.

3. In machinery for rolling and expanding metal tubes, the combination, with the lower roller or roll mounted in fixed bearings and an upper roller or roll driven in the same direction as said lower roller, movable bearings in which said upper roller is mounted, means for driving said rollers in the same direction, vertical guideways for said movable bearings, and hydraulic cylinders normally exerting downward pressure on said movable bearings, of the counter-weights *s*, levers *s'*, carrying at their outer ends said counter-weights, fulcrums *t* for said levers, links *t'*, engaging the other ends of said levers, lifting-plates *u* beneath the inner ends of said levers and to which said levers are connected at the centers of the plates, and vertical rods *v*, connected rigidly and equidistant from said links to said plates *u* at their lower ends and extending thence upwardly on opposite sides of the rollers and engaging said movable bearings at their other ends, said parts constructed to transmit the counterpoising force of said counter-weights *s* to said movable bearings for said upper roller, whereby when said hy-

draulic pressure is removed the roller *d* and its bearings *e* are lifted, substantially as set forth.

4. In machinery for rolling and expanding  
5 metal tubes, the combination, with a lower roller or roll mounted in fixed bearings, an upper roller or roll driven in the same direction as said lower roller, movable bearings in which said upper roller is mounted and which  
10 are normally kept down by powerful pressure, vertical guideways for said movable bearings, means for driving said rollers in the same direction, and means for forcing said movable roller toward said fixed roller, and a counter-  
15 poise adapted to lift said upper roller and its bearings when the downward pressure thereon is removed, of a mandrel for carrying the tube to be operated upon adapted to enter between said rollers, and a mandrel and tube  
20 carriage revolubly supporting said mandrel and adapted to run said mandrel with the

tube to be operated upon sidewise into position between said lower and upper rollers when the upper roller is lifted by said counterpoise and to maintain it in position during 25 the rolling operation and while said upper roller is kept down by powerful pressure and to withdraw it from position when said pressure is removed and said counterpoise again lifts said upper roller, said counterpoise con- 30 structed to permit the free operation of said mandrel and tube carriage sidewise toward and from said rollers, substantially as set forth.

In witness whereof I have hereunto signed 35 my name in the presence of two subscribing witnesses.

THOMAS CRITCHLEY BARRACLOUGH.

Witnesses:

FREDERICK DAVEY,  
GEORGE C. BACON.