

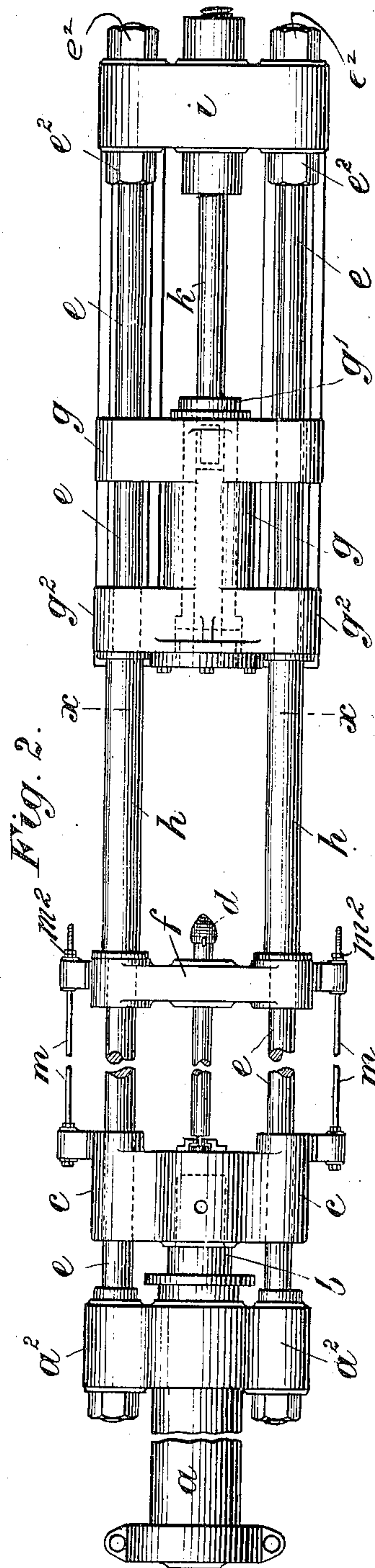
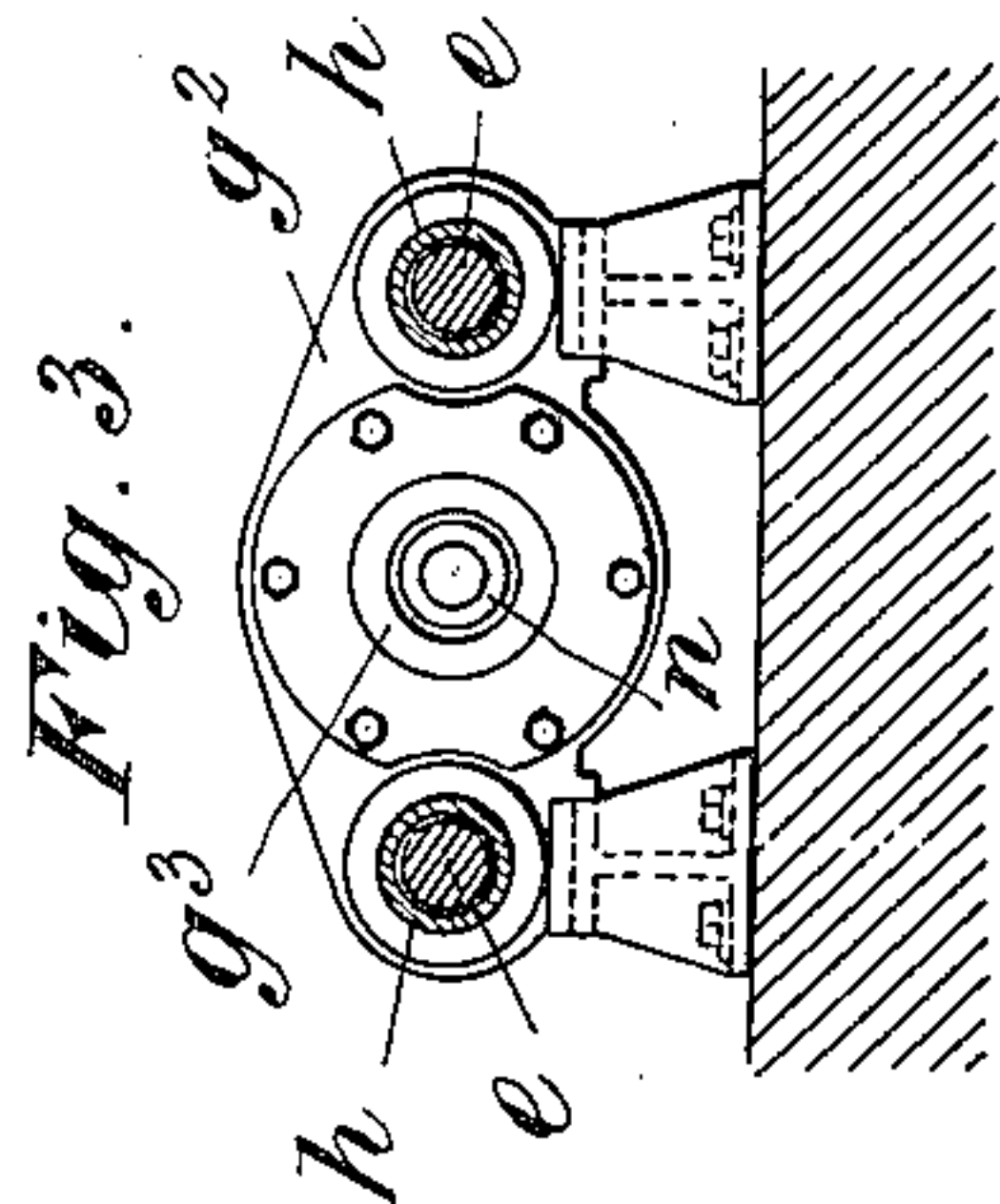
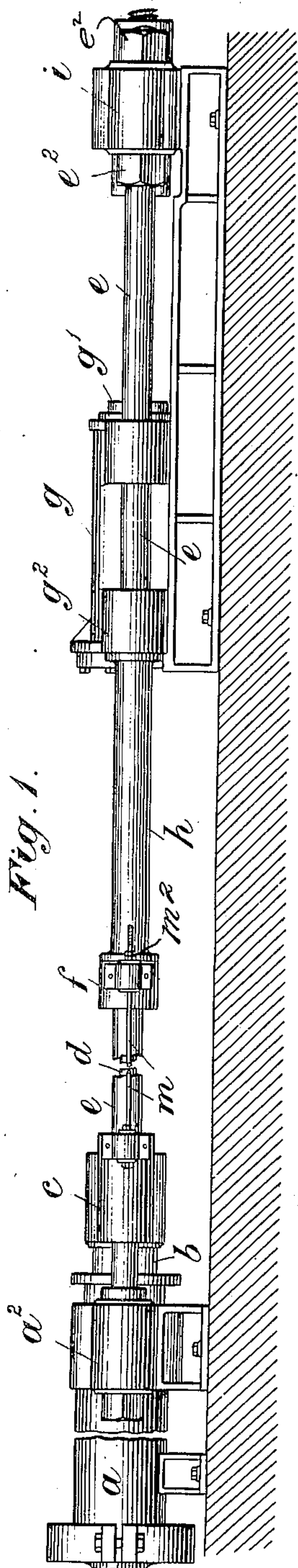
W. U. JACKSON & J. E. JOSEPH.
MACHINERY FOR PIERCING METALLIC BLOOMS OR INGOTS.

APPLICATION FILED DEC. 7, 1907.

Patented Mar. 30, 1909.

2 SHEETS—SHEET 1.

916,875.



Witnesses:
Richard Skerrett
Arthur John Powell

Inventors:
William Richardson Jackson
John Edward Joseph

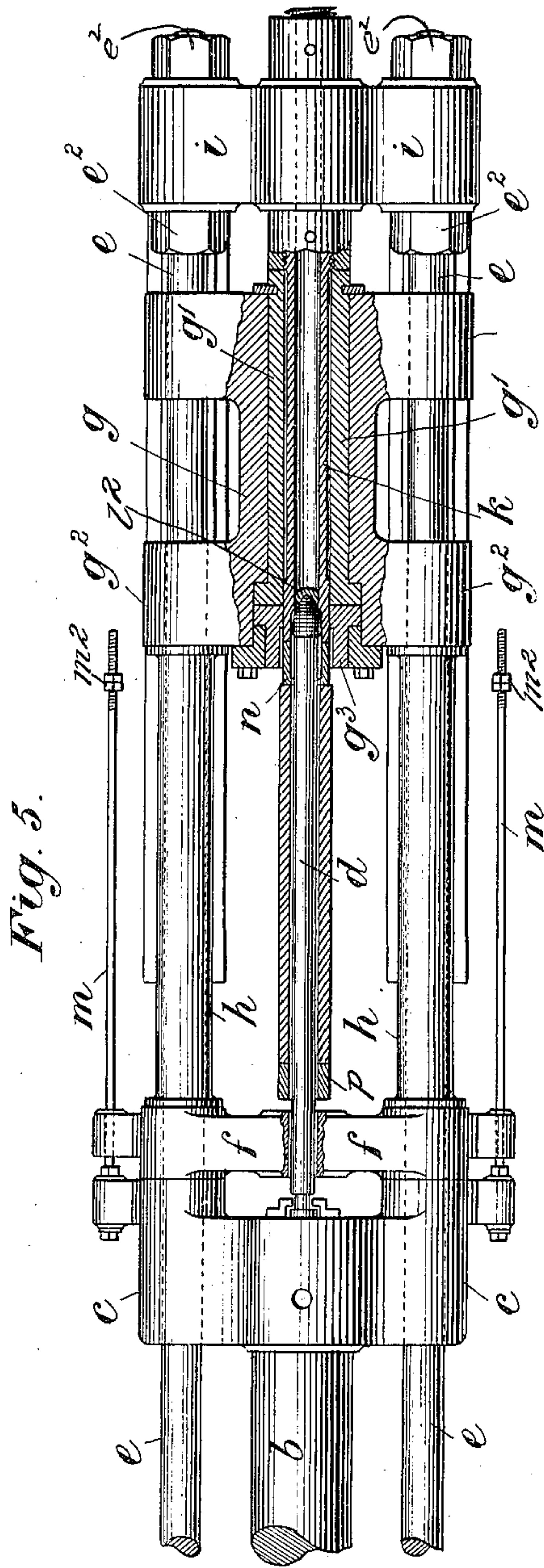
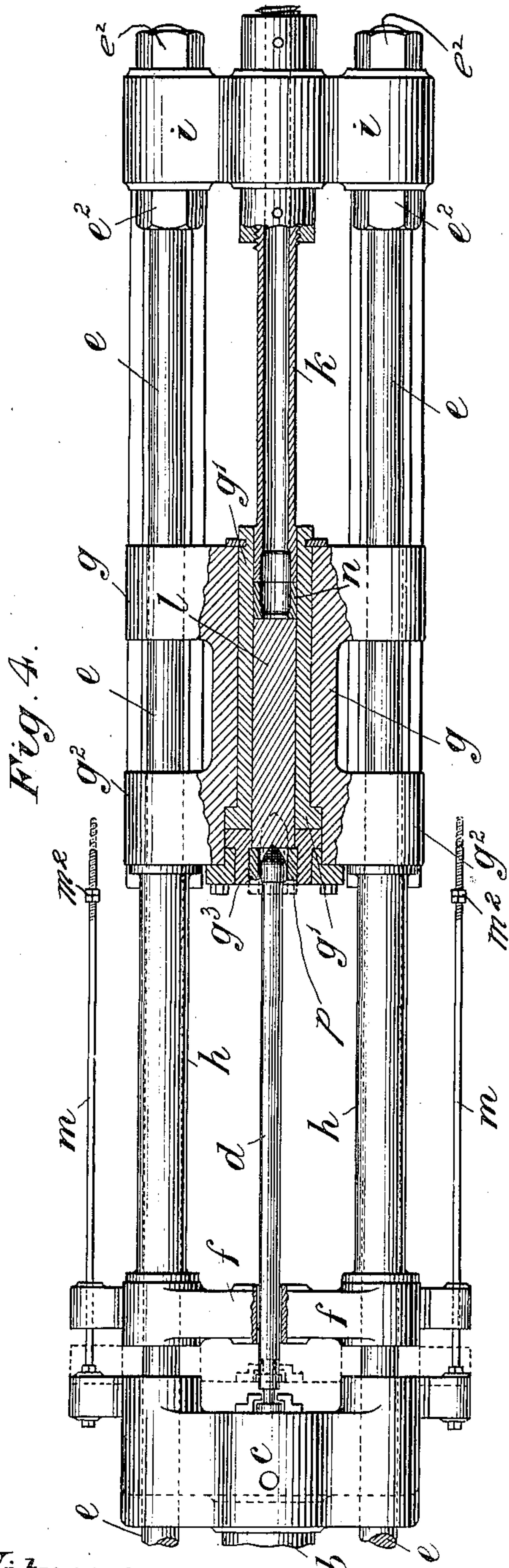
W. U. JACKSON & J. E. JOSEPH.
MACHINERY FOR PIERCING METALLIC BLOOMS OR INGOTS.

APPLICATION FILED DEC. 7, 1907.

916,875.

Patented Mar. 30, 1909.

2 SHEETS—SHEET 2.



Witnesses;—
Richard Kennett
Arthur John Powell

Inventors;—
William Apriehard Jackson,
John Edward Joseph

UNITED STATES PATENT OFFICE.

WILLIAM UPRICHARD JACKSON, OF HEATH TOWN, AND JOHN EDWARD JOSEPH, OF ASTON MANOR, NEAR BIRMINGHAM, ENGLAND, ASSIGNORS TO THE WELDLESS STEEL TUBE CO. LIMITED, OF BIRMINGHAM, ENGLAND.

MACHINERY FOR PIERCING METALLIC BLOOMS OR INGOTS.

No. 916,875.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed December 7, 1907. Serial No. 405,572.

To all whom it may concern:

Be it known that we, WILLIAM UPRICHARD JACKSON and JOHN EDWARD JOSEPH, subjects of the King of Great Britain, respectively residing at Bushbury Road, Heath Town, Staffordshire, England, and No. 4 Lynton Road, Aston Manor, near Birmingham, England, have invented certain new and useful Improvements in Machinery for Piercing Metallic Blooms or Ingots, of which the following is a specification.

Our invention consists of the improvements hereinafter described in machinery for the piercing of blooms or ingots in the manufacture of weldless metallic tubes and other hollow or tubular bodies the said improvements having for their principal object to facilitate the manufacture of the said articles.

In order that our invention may be the better understood we remark that in the machinery to which the said invention relates as herebefore constructed or proposed, the piercing of the heated bloom or ingot has been effected generally by a relative movement between the die or matrix, constituting the heated ingot or bloom container and the piercing mandrel, the die or matrix being held stationary while the piercing mandrel advances axially into the heated ingot or bloom; or the die or matrix receives motion so as to advance the heated ingot or bloom against the stationary piercing mandrel; or both die or matrix and piercing mandrel have received motion in opposite directions.

With the arrangements hereinbefore referred to the removal of the weldless metallic tube or other hollow or tubular body formed, from the machine is attended with difficulty which it is one of the objects of the said invention to obviate. In other machines in which a stationary piercing mandrel has been employed the die or matrix is also preserved stationary during nearly the whole of the piercing operation a ram working in the die or matrix forcing the heated bloom or billet therefrom on to the stationary mandrel.

In carrying our invention into effect we provide for the simultaneous movement in the same direction during the major part of the piercing operation of the die, matrix and piercing mandrel the said parts moving practically as one.

The heated ingot or bloom is supported during the piercing operation by a back stop which may be solid but is preferably made tubular. The tubular back stop may have within it a supplementary solid supporting bar of the same or approximately the same diameter as the piercing mandrel.

The parts of the machinery are so arranged and worked that when the piercing mandrel is approaching or nearing the completion of the piercing operation the supplementary solid supporting bar, where a solid supporting back stop is used, retires in the tubular supporting back stop and permits the piercing of the bloom or ingot from end to end. Where a solid supporting back stop is employed a short intervening tube or die is provided to receive the wad of metal which is pressed from the bloom or ingot as the mandrel completes the piercing process or to permit the piercing tool to pass completely through the bloom or ingot.

Figures 1 and 2 of the accompanying drawings represent in side elevation and plan respectively machinery containing the improvements constituting our invention for the piercing of the blooms or ingots in the manufacture of weldless metallic tubes and the like. Fig. 3 is a cross section taken on the dotted line x, x Fig. 2. Figs. 4 and 5 represent portions of the machinery partly in plan and partly in horizontal section, drawn to a larger scale than Figs. 1, 2 and 3 and illustrate the action hereinafter described of our improved machinery.

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

a is the hydraulic cylinder of the machinery by the hydraulic pressure in which the ram b , mandrel d and holder or carrier g inclosing the matrix g' and die g^3 are actuated as is hereinafter described: c is the crosshead of the ram b to which crosshead the piercing mandrel d is attached as is best seen in Figs. 2, 4 and 5. From the fixed crosshead a^2 of the hydraulic cylinder a to the rear end of the machine two longitudinal rods e, e extend the said rods constituting horizontal guides for the moving parts of the machinery hereinafter described. The opposite sides of the crosshead c are tubular the tubular parts being situated on the guide rods e, e . In front of the crosshead c is a

crosshead f between which and the crosshead g^2 of the die and matrix holder g are tubular stays h, h situated on the rods e, e .

i is the support for the tubular back stop k to which support i the rear ends of the guide rods e, e are fixed by the screw nuts e^2, e^2 . Between the front end of the tubular back stop k and the rear end of the billet l in the ingot container or matrix g' (see Fig. 4) is a short tube or liner n . The crosshead f is connected to the crosshead c by longitudinal bolts m, m .

The action of the machinery is as follows:—

A heated billet l having been introduced into the ingot container or matrix g' and die g^3 fixed to the said matrix g' as is represented in Fig. 4, a short tube or ferrule p is placed in the front end of the die g^3 to guide the bulb of the mandrel d and insure its entering the billet l axially in the initial stage of the piercing operation. On the starting of the machinery the mandrel d is carried forward by the ram b the said mandrel being guided by the crosshead f until the bulb of the mandrel d enters the ferrule p and comes in contact with the front end of the billet l in the die g^3 as is represented in Fig. 4. When by the continuing forward movement of the ram b the bulb of the mandrel d has been forced into the billet l to the extent indicated in dotted lines in Fig. 4 the crosshead c is brought into contact with the crosshead f which together with the die and matrix g' has been up to this stage stationary consequently during the completion of the piercing operation the ram b , crosshead c , mandrel d , crosshead f , tubular stays h, h , matrix and die holder g, g^2 and die g^3 and matrix g' therein move forward as one. As the billet l within the now traveling die g^3 and matrix g' is prevented from advancing with the die g^3 and matrix g' by the short tube n at the front end of the tubular back stop k the piercing action of the mandrel continues and a tubular billet is formed the metal of the tubular billet exuding from the mouth of the traveling die g^3 in which the piercing action takes place.

From the description hereinbefore given it will be understood that an external controlling pressure is exerted by the die g^3 while the piercing mandrel d is acting with internal pressure on the heated bloom or ingot l under treatment the piercing operation being carried on in a controlling die moving with the piercing mandrel.

On the bulb of the mandrel approaching the rear end of the heated bloom or ingot l its action effects the pressing from the end of the bloom of a small wad or disk of metal l^2 the bulb of the mandrel thereby effecting the completion of the piercing operation as is represented in Fig. 5.

By the manufacture of tubular billets by the improved machinery hereinbefore de-

scribed and represented the tubular billet formed is automatically removed from the die and matrix or ingot container and the removal of the mandrel from the tubular billet formed facilitated.

On the reversing of the motion of the hydraulic ram b and the return of the parts to the normal positions represented in Figs. 1 and 2, the mandrel d is removed from the weldless tube or tubular billet formed which falls from the machine but the bulb of the mandrel which is as usual loosely fitted on the end of the mandrel is left in the short tube n . The return of the die and matrix holder g to its normal position does not commence until the nuts m^2, m^2 on the bolts m, m reach the projecting tubular bushes on the opposite sides of the crosshead f .

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

1. A machine for piercing blooms or ingots comprising a power cylinder, a back stop, a pair of longitudinally extending guides connecting the cylinder and back stop, a matrix holder slidable longitudinally on said guides, a piercing mandrel operable by the power cylinder, a cross head slidable longitudinally on said guides and arranged slightly in advance of a coöperating part movable with the mandrel when the latter is in fully retracted position, and members coöperative with the respective guides and connecting the matrix holder and cross head whereby a simultaneous advancing movement is imparted to the matrix holder from the mandrel during the major part of the piercing operation of the bloom.

2. A machine for piercing blooms or ingots comprising a longitudinally movable matrix holder, a relatively fixed back stop arranged at one end thereof, a piercing mandrel having means for giving it a preliminary advancing movement to pierce the end of a bloom contained in the matrix holder, means for simultaneously advancing the matrix holder during the corresponding movement of the mandrel during the major portion of the piercing operation, and means operably connected to the mandrel for returning the matrix holder to initial position during the retraction of the mandrel.

3. A machine for forming tubular bodies comprising a longitudinally movable matrix holder, a relatively fixed back stop, a piercing mandrel having means for advancing it preliminarily to pierce a bloom contained in said holder, a cross head connected to and movable with the matrix holder and adapted to be engaged by a part carrying the mandrel to impart a simultaneous advancing movement to the matrix holder after the said preliminary movement and during the major part of the piercing operation, and rods movable with the mandrel and having parts to engage

said cross head during the retraction of the mandrel to effect a corresponding return movement of the matrix holder.

4. A machine for forming tubular bodies 5 comprising a longitudinally movable matrix holder, a support arranged at one side thereof, a hollow back stop mounted on said support and having one end formed to enter the forward end of a matrix in said holder, a 10 piercing mandrel mounted in coöperative relation with the matrix holder, and means for preliminarily advancing the mandrel to enter the latter in the bloom and for thereafter simultaneously advancing the mandrel and 15 matrix holder during the piercing operation, the hollow back stop being adapted to receive the wad of metal removed by the mandrel from the end of the bloom.

5. A machine for piercing blooms or ingots 20 comprising a matrix holder and a piercing mandrel arranged in coöperative relation and adapted to permit a preliminary piercing movement of the mandrel and a subsequent simultaneous advancing movement of the 25 mandrel and matrix during the major part of the piercing operation, a hollow back stop having an end adapted to enter a matrix in said holder, and a hollow liner adapted to fit into said matrix and to coöperate with the

forward end of the mandrel to remove the 30 wad of metal from the bloom and permit it to pass into the hollow back stop.

6. A tube forming machine comprising a hydraulic cylinder having a ram mounted to operate therein, a support provided with a 35 back stop, longitudinal rods rigidly connecting said support to said cylinder, a cross head attached to said ram and having its opposite sides fitted to slide on said longitudinal rods, a piercing mandrel carried by the said cross 40 head, a secondary cross head also slidable on said longitudinal rods and constituting a guide for the piercing mandrel during its preliminary movement, a matrix holder having its opposite sides fitted to slide on said longi- 45 tudinal rods, and tubular members surrounding said longitudinal rods between the secondary cross head and the matrix holder and serving to operatively connect said parts.

In testimony whereof we have hereunto set 50 our hands in presence of two subscribing witnesses.

WILLIAM UPRICHARD JACKSON.
JOHN EDWARD JOSEPH.

Witnesses:

RICHARD SKERRETT,
ARTHUR JOHN POWELL.