R. ANDERSON.

MACHINE FOR BENDING METAL BARS.

APPLICATION FILED OCT. 31, 1908.

947,288.

Patented Jan. 25, 1910.

3 SHEETS—SHEET 1.

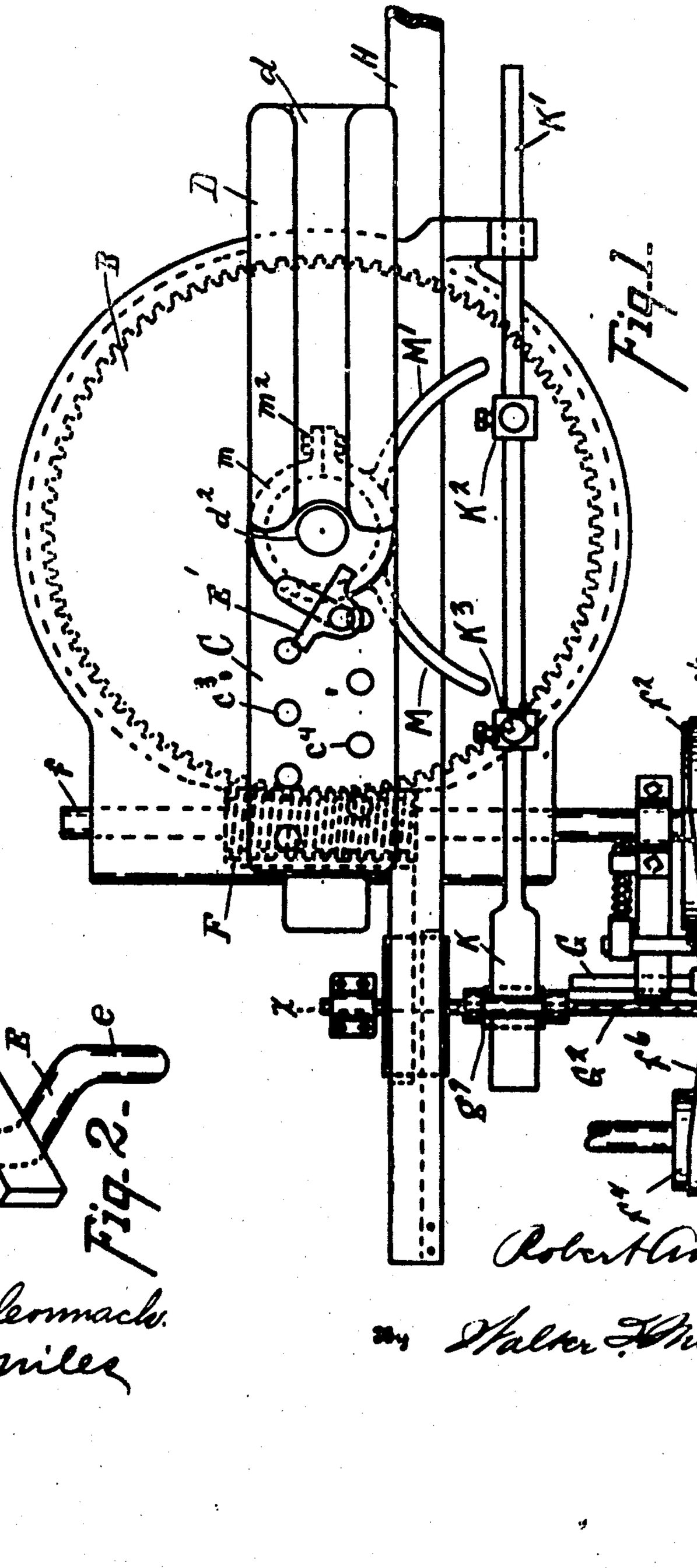

Fig. 1.

Fig. 2.

Witnesses

A. McCormack.

C. W. Miles

Inventor

Robert Anderson

By Walter D. Murray

Attorney

R. ANDERSON.

MACHINE FOR BENDING METAL BARS.

APPLICATION FILED OCT. 31, 1908.

947,288. Patented Jan. 25, 1910.

3 SHEETS—SHEET 2.

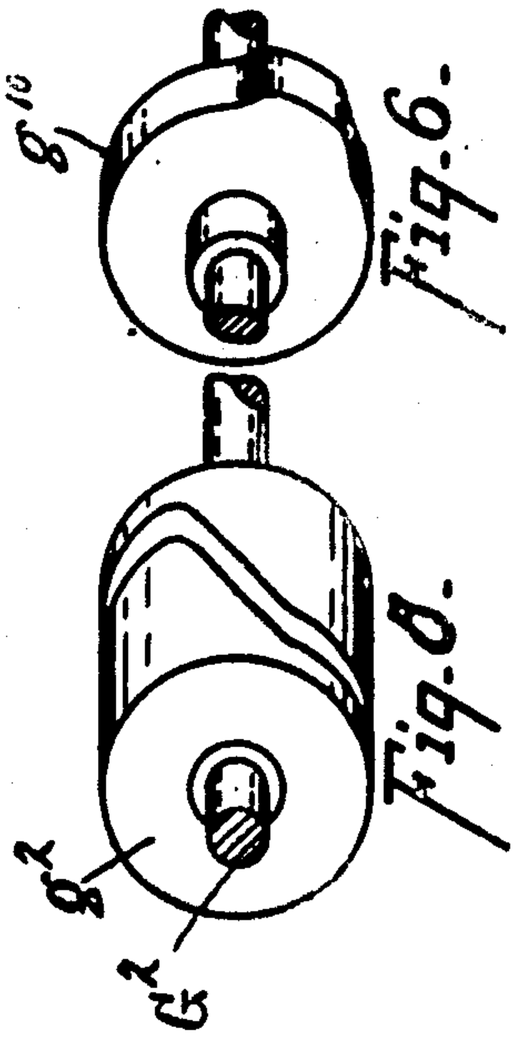

Fig. 6.

Fig. 8.

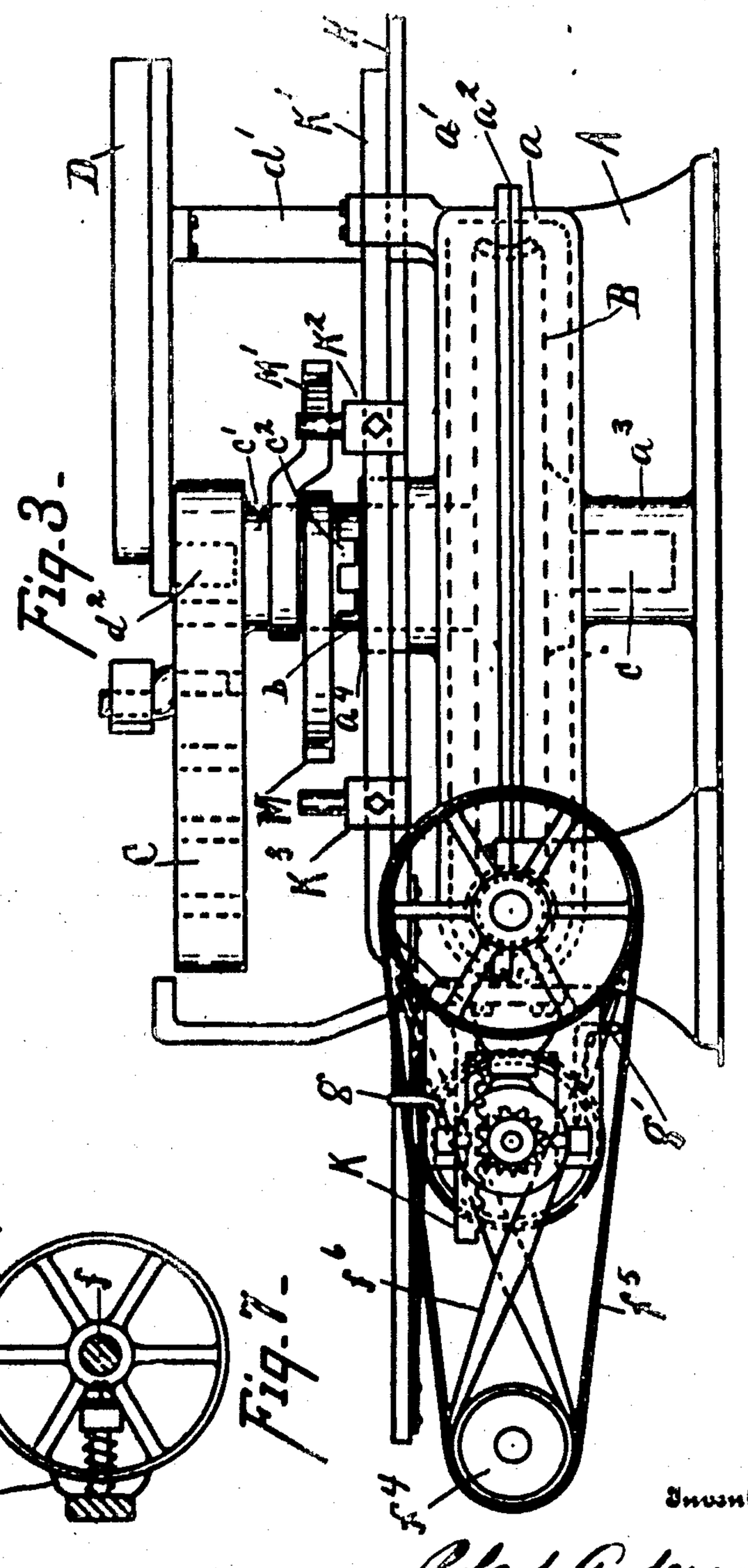

Fig. 3.

Fig. 7.

Witnesses
A. Ino Lermacks.
C. W. Miller.

Inventor
Robert Anderson
By Walter Murray
Attorney

R. ANDERSON.

MACHINE FOR BENDING METAL BARS.

APPLICATION FILED OCT. 21, 1908.

947,288. Patented Jan. 25, 1910.

3 SHEETS—SHEET 2.

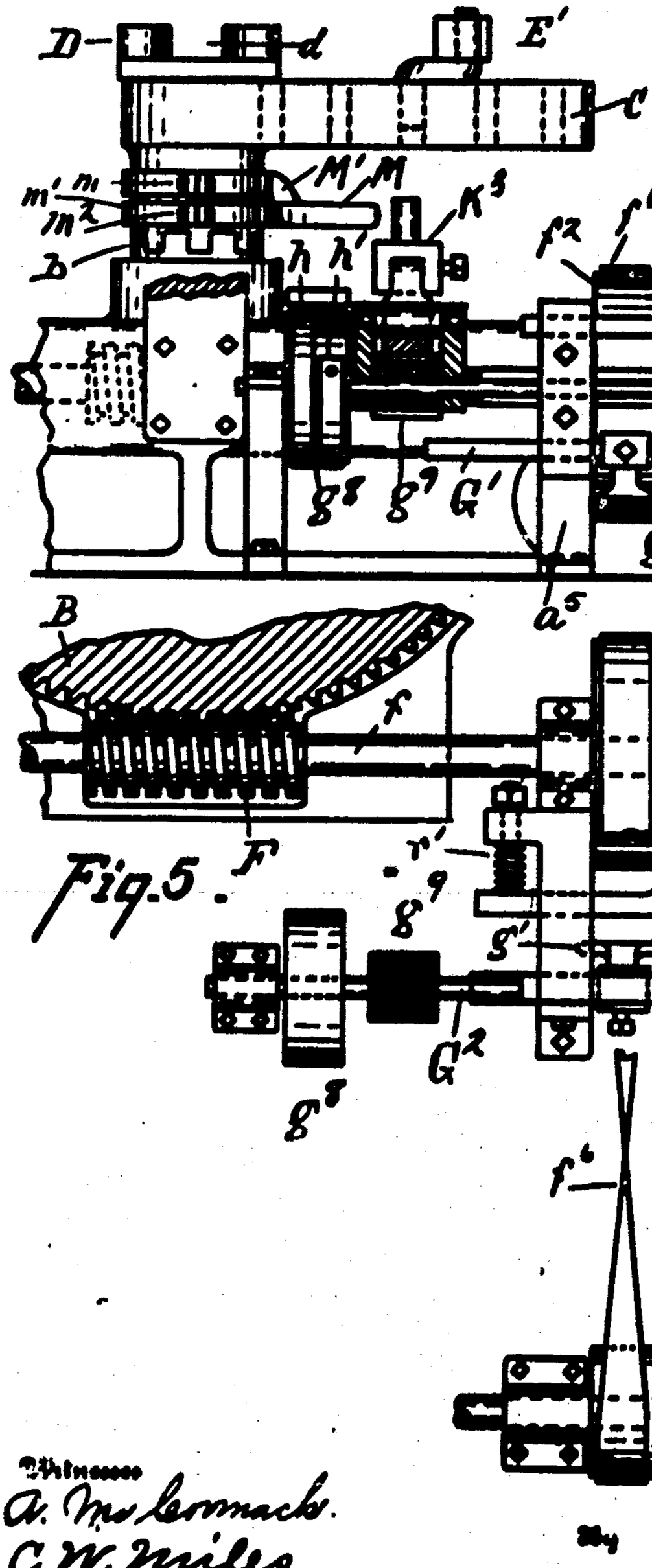

Fig. 4.

Fig. 4'

Fig. 5.

Witnesses
A. McCormack.
C. W. Miller.

Inventor
Robert Anderson
By Talbot & Murray
Attorney

UNITED STATES PATENT OFFICE.

ROBERT ANDERSON, OF CINCINNATI, OHIO, ASSIGNOR TO THE FERRO-CONCRETE CONSTRUCTION COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

MACHINE FOR BENDING METAL BARS.

947,288

Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed October 31, 1908. Serial No. 460,270.

To all whom it may concern:

Be it known that I, ROBERT ANDERSON, a citizen of the United States of America, and resident of Cincinnati, county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Machines for Bending Metal Bars, of which the following is a specification.

The object of my invention is a machine for bending metal bars in any direction desired, and which may be set to stop automatically when the bend has reached the desired angle, in order that a large number of similarly bent bars may be had in a short period of time.

Referring to the accompanying drawings, in which like parts are indicated by similar reference letters wherever they occur throughout the various views, Figure 1 is a plan view of the metal bending machine embodying my invention, part of the machine being shown broken off upon lines 1—1 of Fig. 5. Fig. 2 is a perspective view of the shoe which engages the metal bar to impart the bending force to it. Fig. 3 is a side elevation of the machine. Fig. 4 is a sectional view taken upon line *x*—*x* of Fig. 1. Fig. 4′ is a diagrammatical view of the groove in the cylinder which actuates the belt shifting mechanism. Fig. 5 is a plan view of the parts shown in Fig. 4, but with the enlarged worm wheel which actuates the bending arm, shown in section. Fig. 6 is a perspective view of the cam for stopping the momentum of the pulley upon the shaft of the worm. Fig. 7 is a detail sectional view taken upon line *v*—*v* of Fig. 4. Fig. 8 is a perspective view of the grooved cylinder for regulating the belt shifting mechanism.

Referring to the parts: the base, A, of the machine has an enlarged shallow cylindrical housing, which is made of two shells, *a*, *a*′, coupled together at the flanges, a^2. The shells have vertical axial bearings, a^3, a^4. Within the housing formed by the shells, *a*, *a*′, is an enlarged worm wheel, B, which has a hollow shaft which extends through the bearing, a^4, and terminates in vertical teeth, *b*.

The bending arm, C, has a shaft, *c*, which extends downward through the hub of the worm wheel into the bearing, a^3, as indicated in Fig. 3. Shaft, *c*, has a collar, *c*′, with teeth, c^2, at its lower end which engage with the teeth, *b*, so that the bending arm, C, moves with the worm wheel. A stationary jaw, D, with a longitudinal way, *d*, is supported at one end by a standard, *d*′, which is supported by the shell, *a*′. The opposite end of the jaw, D, has a downwardly projecting pin, d^2, which extends into an axial bore in the bending arm, C, as indicated in Figs. 1 and 3. The bending arm, C, has in it two rows of perforations, c^3, c^4, which may be engaged by the arm, *e*, of a Z-bar, E, upon the opposite arm, *e*′, of which a shoe, E′, is rotatably mounted. The bar to be bent is laid in the way, *d*, while the bending arm, C, is in axial alinement therewith, and the shoe, E′, is brought to bear against the bar. By the rotation of the arm, C, the shoe, E′, bends the metal bar.

I will now describe the means for actuating the bending arm, and for automatically regulating the degree of the bend in the bar. Meshing with the worm wheel, B, is a worm, F, whose shaft, *f*, carries a fixed pulley, *f*′, and two idle pulleys, f^2, f^3. From the main driving drum, f^4, a straight belt, f^5, and a cross belt, f^6, pass over the pulleys upon the shaft, *f*. The belt, f^5, is engaged by a finger, *g*, projecting from the belt shifting arm, G. Belt, f^6, is engaged by a finger, *g*′, projecting from the belt shifting arm, G′. The movements of the arms, G, G′, are regulated by the rotation of a cylinder, g^2, into the groove of which arm, G, has projecting a pin, g^4, and arm, G′, has projecting a pin, g^5. The groove, in the cylinder, g^2, has two longitudinal branches, g^6, g^7, connected by a transverse branch, g^8. When the two belts, f^5 and f^6, are upon the idlers, the pins, g^4 and g^5, stand at the junctures of the transverse part, g^8, of the groove with the longitudinal parts, g^7 and g^6, so that a rotation of the cylinder, g^2, in one direction, as, for instance, in the direction indicated by the arrow Fig. 4′, would carry the pin, g^4, down the transverse member, g^8, of the groove so as to move the belt, f^5 on to the working pulley, *f*′, while this same motion of cylinder, g^2, would simply cause the groove, g^6, to travel along the pin, g^5, without moving the arm, G′. A motion in a direction opposite to the direction of the arrow in Fig. 4′, would cause the pins, g^4, and g^5, to resume their normal positions, that is, would carry the arm, G, back to the position wherein the belt, f^5, was on the loose pulley, f^3.

The rotation of the cylinder, g^2, is ef-

fected in the following manner: The cylinder is secured upon the end of a shaft, G^2, mounted rotatably in the standards, a^3 and a^4. Shaft, G^2, carries at its opposite end a pulley, g^7, which has passing around it in opposite directions and secured to it straps, h, h', which are secured to an actuating lever, H, so that by a reciprocation of the lever, H, in one direction or the other the shaft, G^2, may be rotated so as to carry either one or the other of the belts, f^6, or f^8, on to the pulley, f', which causes the bending arm, C, to be rotated either in one direction or the other.

The rotation of the bending arm is automatically stopped by the following means. Shaft, G^2, carries a gear, g^6, which is engaged by a rack, K, upon the end of a longitudinal power controlling arm, K', which has upon it blocks, K^2, K^3, which may be adjusted upon the arm, K', so as to be struck by the arms, M, M', upon the collar, c', of the bending arm, C. The arms, M, M', have at their inner ends split rings, m, m', which may be clamped by means of screw, m^2, shown in Fig. 1 and Fig. 4, so as to regulate the position of the arms, M, M', relatively to the bending arm, C. By the relative adjustments of the arms, M, M', and the blocks, K^2, K^3, the number of degrees through which the bending arm will move before one of the arms, M, or M', come in contact with one of the blocks, K^2, K^3, is regulated. The arms, M, M', and the blocks, K^2, K^3, are adjusted so that when one of the blocks is struck by one of the arms, it will push the arm, K', so as to rotate the shaft, G^2, in a direction such as to carry the pin, g^4, or g^5, in a reverse direction from that in which it has been previously moved, by the movement of the lever, H, viz., the movement of the lever, H, carries one or the other of the belts f^6, or f^8, on the fixed pulley, f', and the automatic movement of the lever, K, moves said belt from the fixed pulley on to one of the idlers. Shaft, G^2, carries a cam, g^{10}, to contact a brake shoe, R, and carry it against the resistance of springs, r, r', into contact with pulley, f', at the moments the belts are shifted from pulley, f', upon either of the idlers, for the purpose of stopping the momentum thereof.

What I claim is:

1. In a machine for bending metal bars the combination of a fixed jaw for holding the bar to be bent, a bending arm, means for mounting the bending arm rotatably adjacent to the jaw, a shoe carried by the bending arm and adapted to contact the bar, means for adjusting the shoe toward, and away from the jaw, to vary the bend to be made in the bar, means for rotating the arm and an automatic means for arresting the rotation of the arm at a predetermined point.

2. In a machine for bending metal bars and comprising a fixed jaw and a rotatable bending arm, seats formed in the arm, a Z-bar adapted to be journaled in the seats in the arm and a shoe mounted rotatably upon the Z-bar for contacting the bar to be bent.

3. In a machine for bending metal bars the combination of a fixed jaw for holding the bar to be bent, a rotatable arm journaled adjacent to said jaw for engaging and bending the bar, mechanisms for rotating said arm, a power controlling arm for controlling the operation of said mechanisms, a contact device secured to and adjustable relatively of said rotatable arm for engaging and actuating said power controlling arm to cut off the power at a predetermined point, and a brake actuated by said power controlling arm for retarding the motion of said rotatable arm after the power is cut off.

4. In a machine for bending metal bars the combination of a fixed jaw for holding the bar to be bent, a rotatively mounted bending arm adjacent to said jaw and adapted to engage the bar, means for rotating said arm, a second arm for controlling the operation of said means, an adjustable contact device carried by said bending arm and adapted to engage and actuate said second arm for controlling the operation of said means, a brake for retarding the motion of said bending arm and means actuated by said second arm for setting said brake.

ROBERT ANDERSON.

Witnesses:
WALTER F. MURRAY.
AGNES McCORMACK.