No. 814,732. PATENTED MAR. 13, 1906.

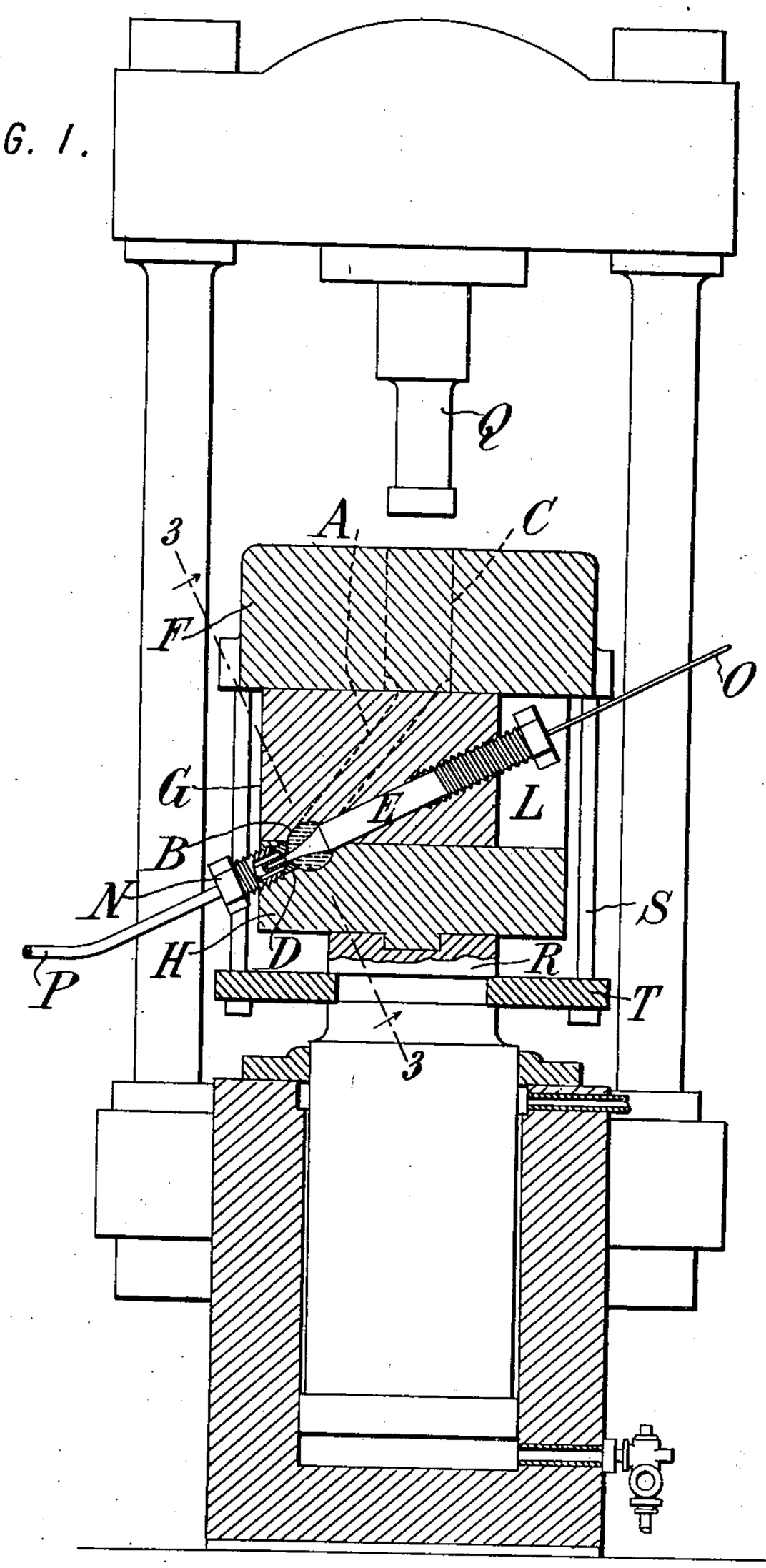
N. A. ROBERTSON.

APPARATUS FOR EXTRUDING METALS.

APPLICATION FILED FEB. 11, 1905.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:
Fred. Whitty
René Bruine

INVENTOR:
Norman A. Robertson,
By Attorneys,
Arthur C. Fraser & Co.

No. 814,732. PATENTED MAR. 13, 1906.

N. A. ROBERTSON.

APPARATUS FOR EXTRUDING METALS.

APPLICATION FILED FEB. 11, 1905.

2 SHEETS—SHEET 2.

FIG. 2.

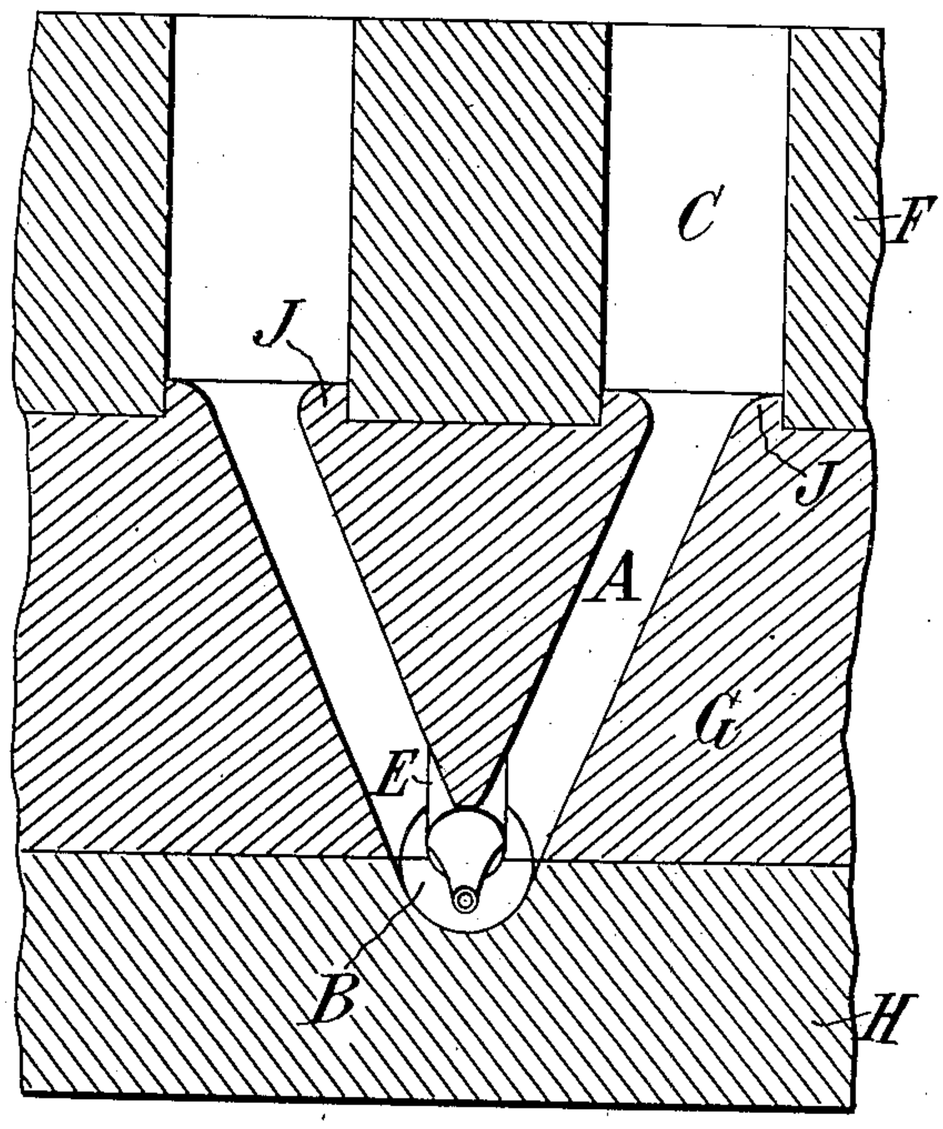


FIG. 3.

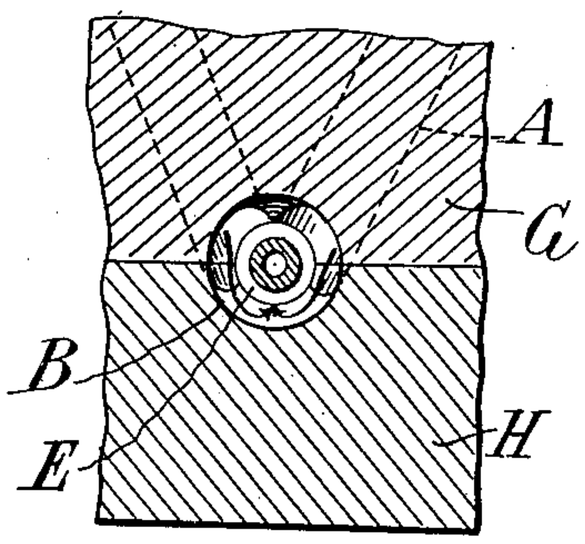


FIG. 4.

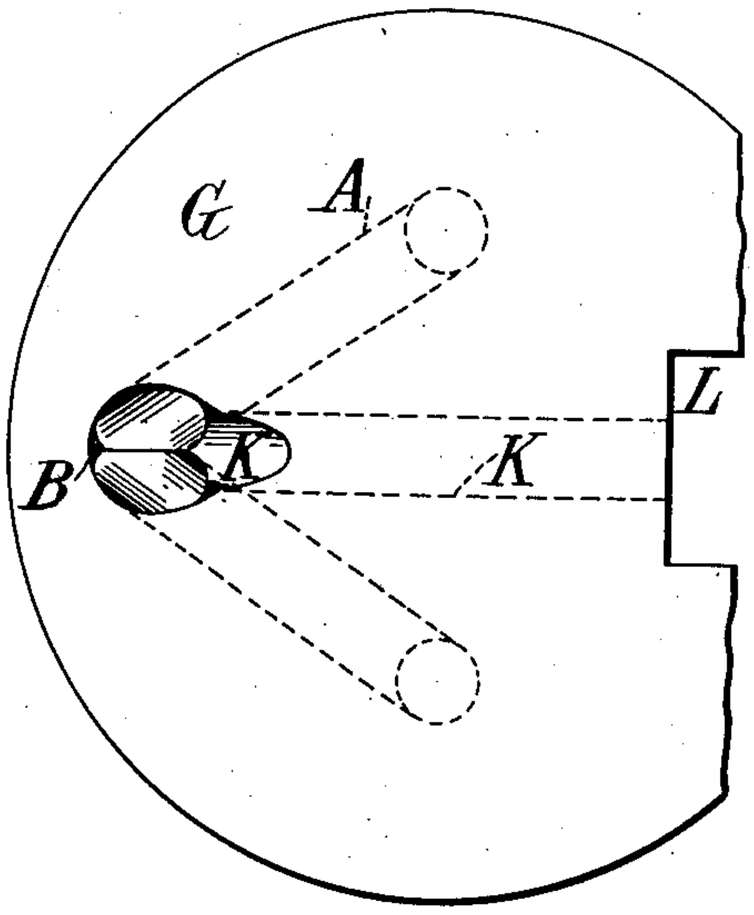
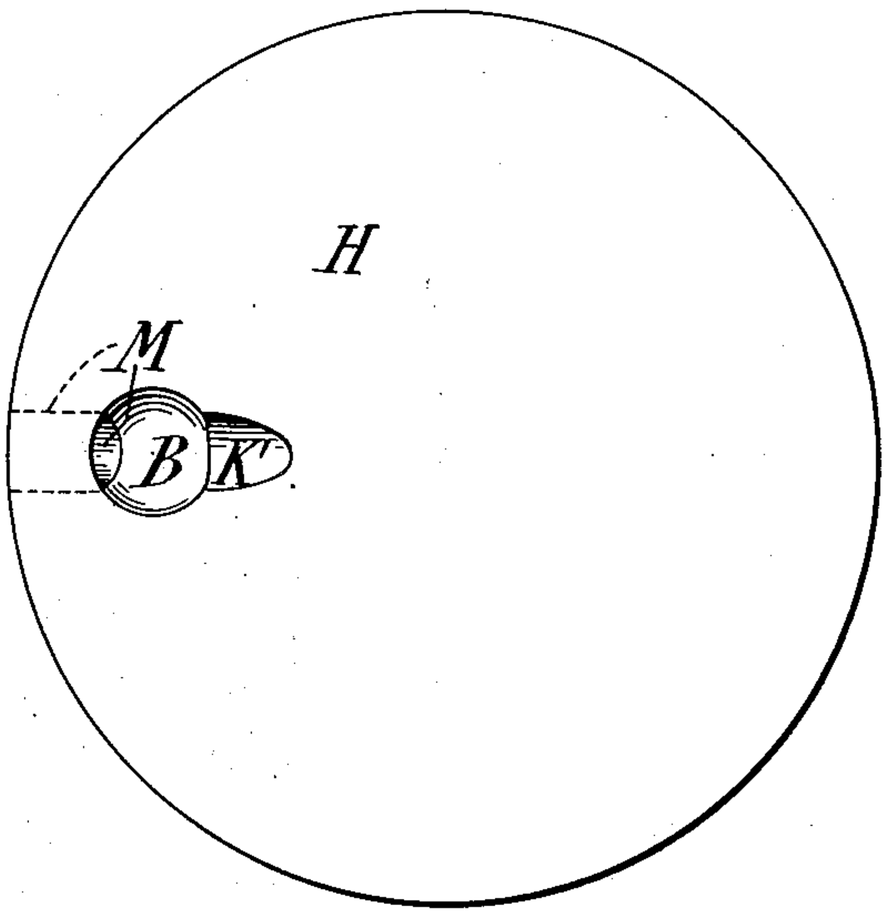


FIG. 5.



WITNESSES:

Fred Whitz

René Bruine

INVENTOR:

Norman A. Robertson,

By Attorneys,

Arthur G. Fraser & Co.

UNITED STATES PATENT OFFICE.

NORMAN A. ROBERTSON, OF NEW YORK, N. Y.

APPARATUS FOR EXTRUDING METALS.

No. 814,732. Specification of Letters Patent. Patented March 13, 1906.

Application filed February 11, 1905. Serial No. 245,309.

To all whom it may concern:

Be it known that I, NORMAN A. ROBERTSON, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Apparatus for Extruding Metals, of which the following is a specification.

In my application for patent, Serial No. 242,987, filed January 27, 1905, I have disclosed an apparatus which is specially adapted for the extruding of stiff metals—such, for example, as aluminium. The metal is introduced in separate streams, the passages or cylinders through which the metal is forced being a considerable distance apart from each other and from the core between them, so as to provide heavy walls capable of resisting extreme pressures at the extremely high temperatures necessary. The present invention is based upon a specific form of such an apparatus in which the product emerges in a direction at an angle with the vertical, the direction being preferably as nearly horizontal as possible, thereby obtaining important advantages in convenience and compactness. Preferably the core enters the die-chamber at the side opposite the die, and the passages through which the metal is forced lead downward and obliquely, so as to direct the metal toward the die, and thus minimize the strain on the core. Certain other advantages are referred to in detail hereinafter.

The accompanying drawings illustrate an embodiment of the invention.

Figure 1 is an approximately diametral section of the complete machine. Fig. 2 is a section approximately on the plane formed by the center lines of the oblique passages and the cylinders. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is an under side view of the block in which is the upper half of the die-chamber. Fig. 5 is a top view of the block in which is the lower half of the same.

Although the machine illustrated is specially adapted for the difficult class of work above referred to, it may also be used for extruding softer materials, if desired. The machine is also specially designed to have a core which may be used to form a hollow or tubular product or to carry a core-wire of the product, though in connection with some of the features claimed the core may be omitted, so as to form a solid wire of the product.

In the embodiment of the invention illustrated a plurality of separate passages lead downward into the die-chamber being unconnected back of said chamber and being spaced apart a considerable distance from each other. The term "passage" is used in its generic sense to include the cylinders in which the plungers reciprocate or the oblique passages or conduits which preferably connect the cylinders with the die-chamber and to include also the combination of each oblique conduit with its cylinder.

Oblique conduits A are provided, preferably two in number, which converge toward each other to meet in the die-chamber B, which lies in the plane transverse to the line connecting the centers of the cylinders C, but in said plane is offset as far as convenient from the plane which passes through the two center lines of the cylinders C. The effect of offsetting the die-chamber from the plane of the two cylinders C is to deflect the course of the material from the vertical and to permit it to emerge in a horizontal or an approximately horizontal direction. The die-chamber is provided with a die D at the outermost side—that is, at the side toward which the oblique conduits A tend—and a core E, entering the chamber at the opposite side. The term "die-chamber" includes the entire space surrounding the exposed portion of the core and in which the streams of material coalesce around the core. By this arrangement the movement of the material is in a line nearly parallel with the core, so that even though the pressure be very great and the temperature very high the strain tending to bend the core is comparatively small. The strain on the core is further avoided by using two oblique conduits A, which direct the material against opposite sides of the core. In fact, a large part of the material passes around to the under side of the core, as indicated by the arrows of Fig. 3. Here the two streams coalesce and press upward against the under side, resisting the downward component of the pressure from the material which bears directly on the core at points above its center.

Preferably the principal parts of the machine are formed in three separate blocks, which I designate, respectively, as the "upper" block F, the "intermediate" block G, and the "lower" block H. It is understood, however, that the machine may be used in a horizontal position (that is to say, with its axis horizontal instead of vertical, as illustrated,) in which case the two end blocks F

and H are not, strictly speaking, upper and lower blocks. The upper block is a solid cylindrical block with the two cylinders C formed therein and is thus very simple and very strong. It fits directly upon the intermediate block G, the position being determined by the fitting of the lower ends of the cylinders C upon bosses J at the mouths of the oblique conduits A. In the intermediate block G are formed the oblique conduits A, the upper portion of the die-chamber B, and the passage K for the reception of the core E. At its rear end the passage K is screw-threaded, as indicated in Fig. 1, to permit adjustment of the core. A groove L may be provided at the rear of the block G in order to accommodate the head of the core E. In the lower block H are formed the lower portion of the die-chamber B and preferably a portion K′ of the passage for the core and also an opening M for receiving the die D. The die may be introduced from the outside and adjusted by means of a hollow screw N, as is well understood in the art.

The core-wire O enters at the back of the machine, passes through the hollow core E of the machine, upon emerging from which it is incased in the metal to be extruded, and the product P emerges through the die and the hollow screw and is wound on a reel or otherwise disposed of in continuous lengths. In the beginning of the operation the oblique conduits A and cylinders C are filled with aluminium or other material to be extruded, molten or in the form of slugs or otherwise, and, if necessary, brought to the desired temperature. A pair of plungers Q are then forced into the cylinders, preferably by raising the structure composed of the several blocks F, G, and H, by means of a hydraulic plunger R, and the material is forced down through the converging conduits A. In the chamber B the streams coalesce, as described, so as to equalize or nearly equalize the pressure on all sides of the core and to pass around the core of the machine through the die, carrying with them the core-wire O. When the desired amount of material has been extruded, the plunger R is forced down, carrying with it the three blocks F, G, and H, it being connected to the upper block F by means of bolts S and a ring T.

The metal to be extruded may be maintained at the desired temperature by heating the apparatus from the outside, if necessary. For example, a series of gas-blowpipes may be used for this purpose, with jets of flame impinging upon the blocks, as is understood by those skilled in the art.

Though I have described with great particularity of detail a specific embodiment of the invention, yet it is not to be understood therefrom that the invention is limited to the specific embodiment disclosed.

Various modifications thereof in detail and in the arrangement and combination of the parts may be made by those skilled in the art without departure from the invention.

What I claim is—

1. An extruding-machine having a die-chamber with a die at one side and a core entering the chamber at the opposite side, cylinders in lines offset from said chamber, and passages extending obliquely from the cylinders in the direction of the chamber and converging toward said chamber.

2. An extruding-machine having an end block in which is a lateral die, an intermediate block in which is a lateral core carried entirely by said intermediate block, and an opposite end block in which is a cylinder for conducting material to the die-chamber.

3. An extruding-machine having a block in which is a lateral die, and a second block in which are a lateral core and converging passages leading downward to the die-chamber.

4. An extruding-machine having a lower block in which is a lateral die, an intermediate block in which are a lateral core and a passage leading downward to the die-chamber, and an upper block in which is a cylinder from which the material is forced into and through said passage.

5. An extruding-machine having a block in which is a die, and a second block in which is a core extending at an angle with the axis and in which is an oblique conduit extending at an acute angle with said core.

6. An extruding-machine having an end block in which is a die, an intermediate block in which is a core extending at an angle with the axis and in which is an oblique conduit extending at an acute angle with said core, and an opposite end block in which is a cylinder in the axial plane for conducting material to said oblique conduit.

7. An extruding-machine having a die-chamber with a die at one side and a core entering the chamber at the opposite side, a pair of cylinders in a plane offset from said chamber, and a pair of passages extending obliquely from the plane of the cylinders in the direction of the chamber and converging toward said chamber.

8. An extruding-machine having a die-chamber with a die at one side and a core entering the chamber at the opposite side, and having vertical cylinders C and converging passages A leading downward to said chamber, said chamber being offset from the plane of said cylinders, and said passages A being inclined to direct the material toward the side of the chamber in which is the die, so as to minimize the strain on the core and to counterbalance each other.

9. An extruding-machine having an end block H in which is a lateral die, an opposite end block F in which are vertical cylinders C, and an intermediate block G in which is a lateral core E carried entirely by said interme-

diate block, the meeting faces of said blocks H and G being formed to provide a die-chamber B between them and offset from the plane of said cylinders, and said intermediate block having converging passages A leading downward obliquely from said cylinders to said die-chamber.

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

NORMAN A. ROBERTSON.

Witnesses:

DOMINGE A. USINA,

THEODORE T. SNELL.