C. H. BRASTED.

METHOD OF AND APPARATUS FOR FORMING METAL STRIPS.

APPLICATION FILED SEPT. 13, 1918.

1,344,577.

Patented June 22, 1920.

2 SHEETS—SHEET 1.

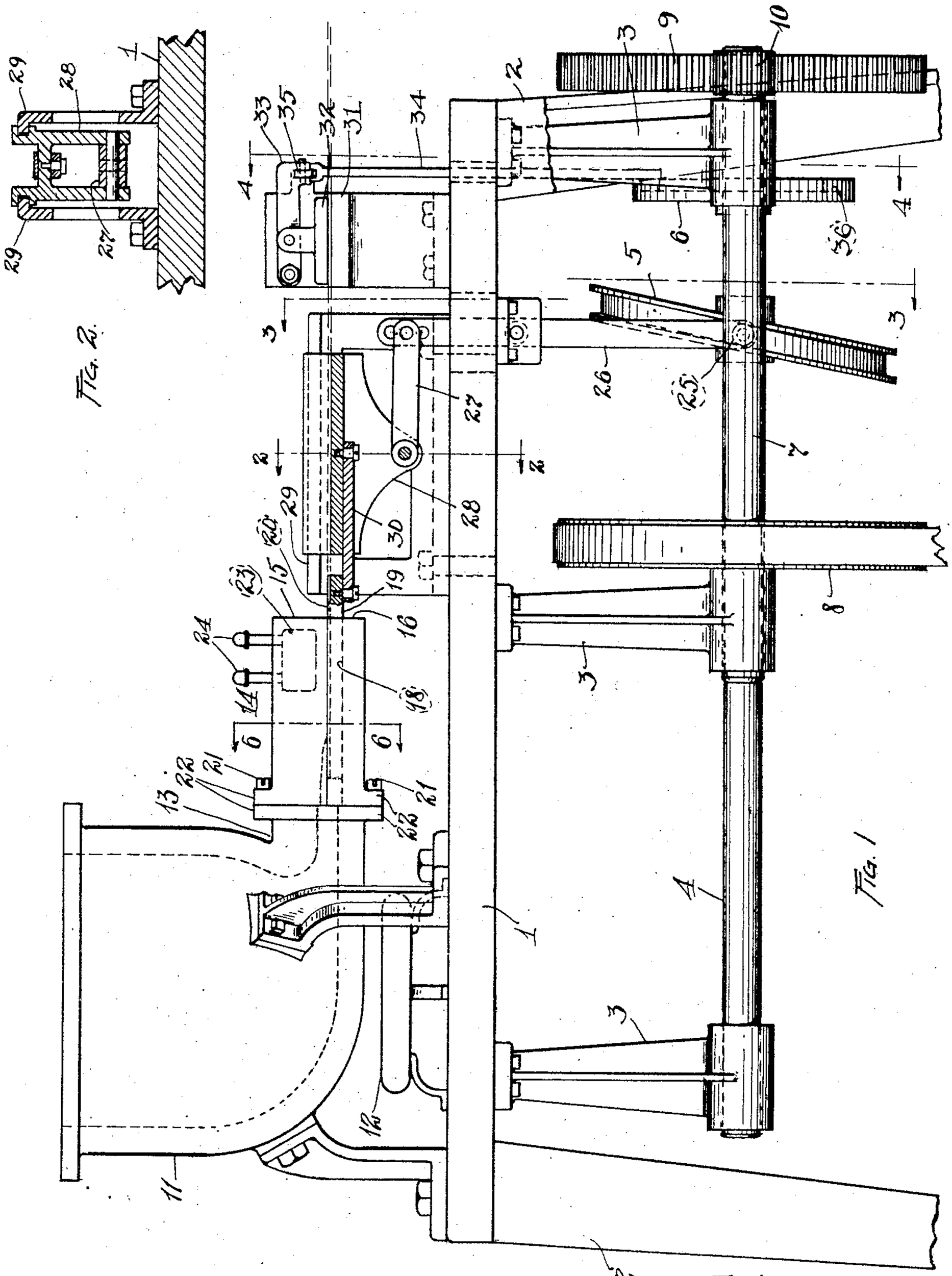

FIG. 2.

FIG. 1

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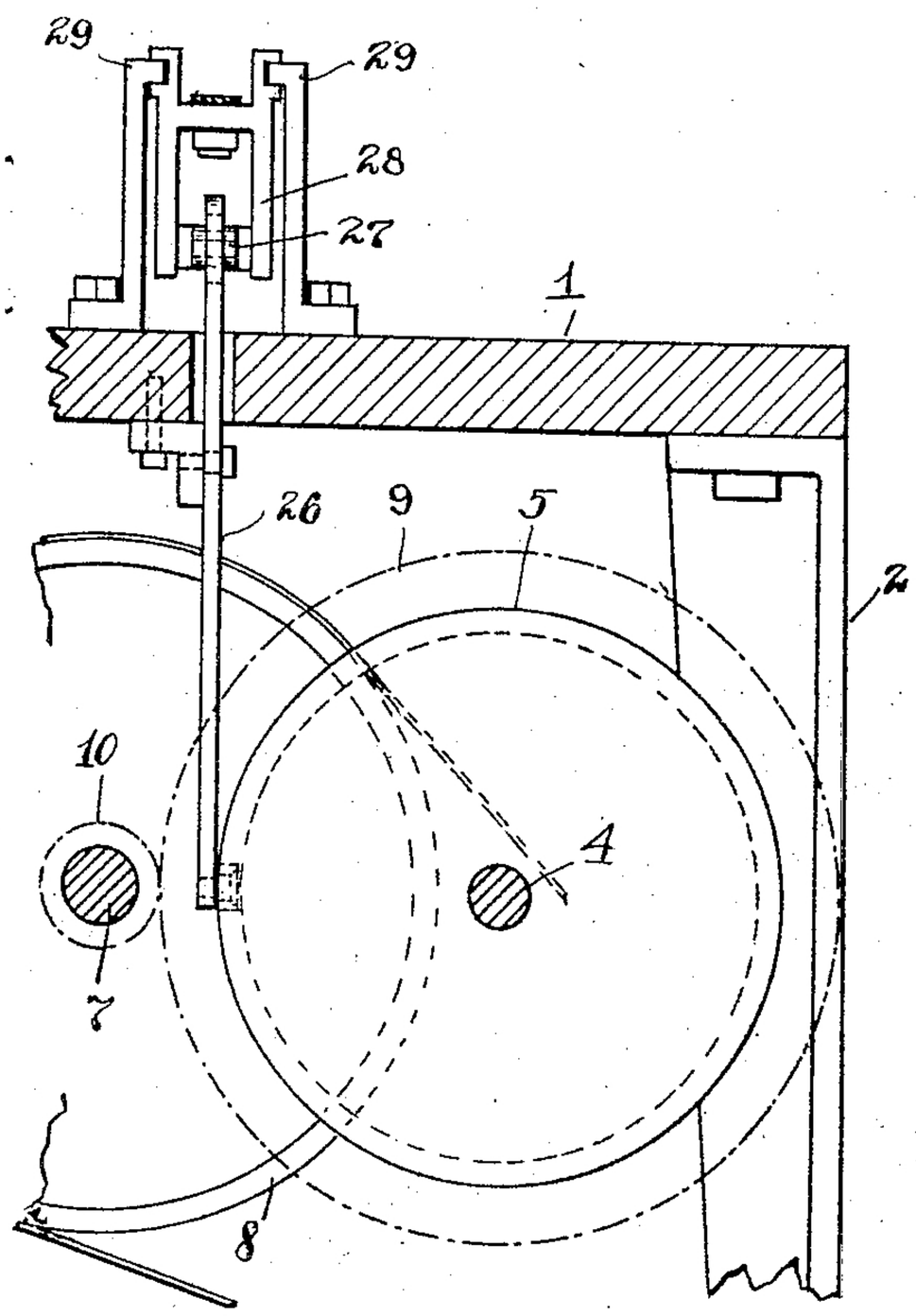

FIG. 3

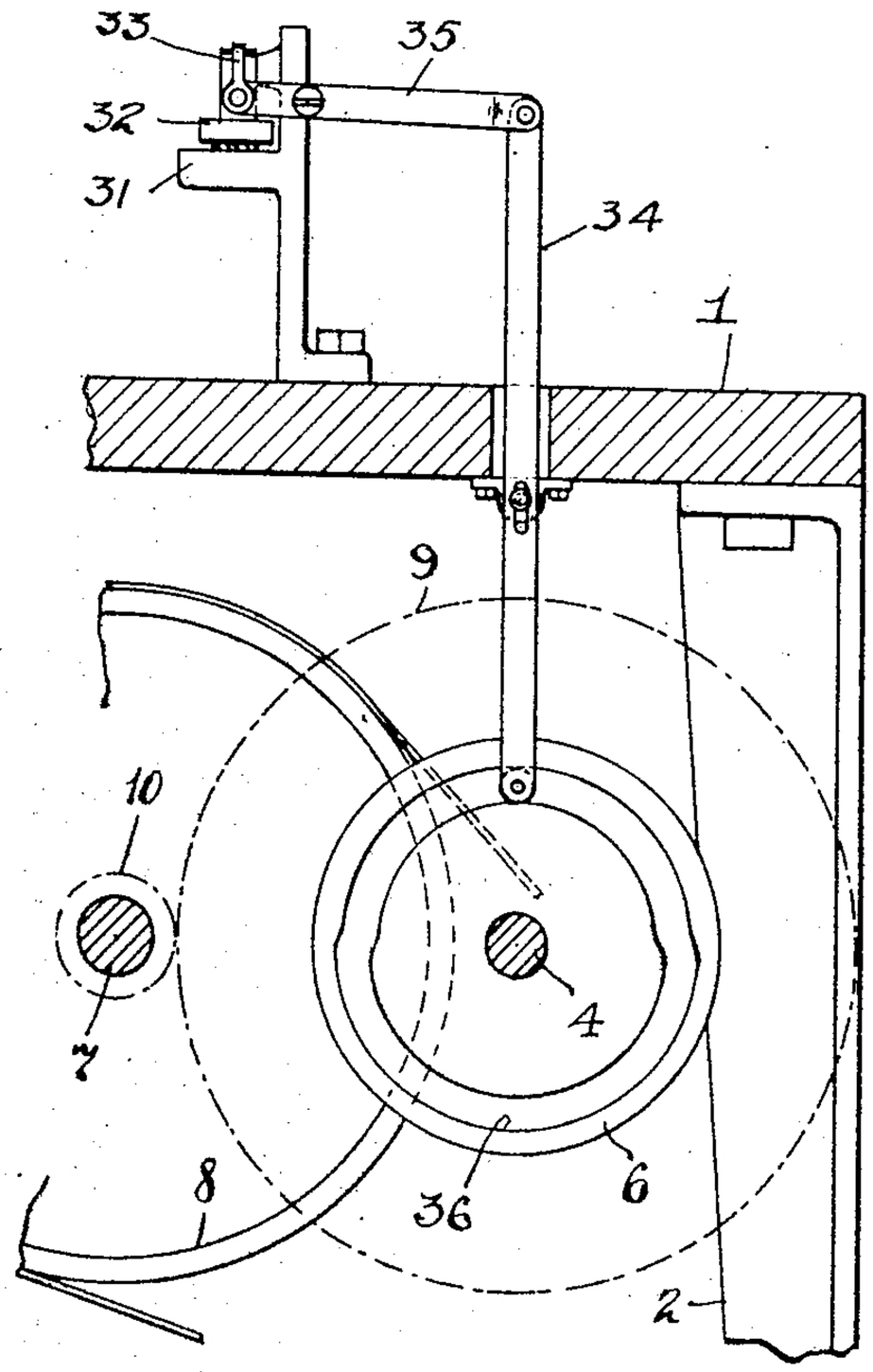

FIG. 4

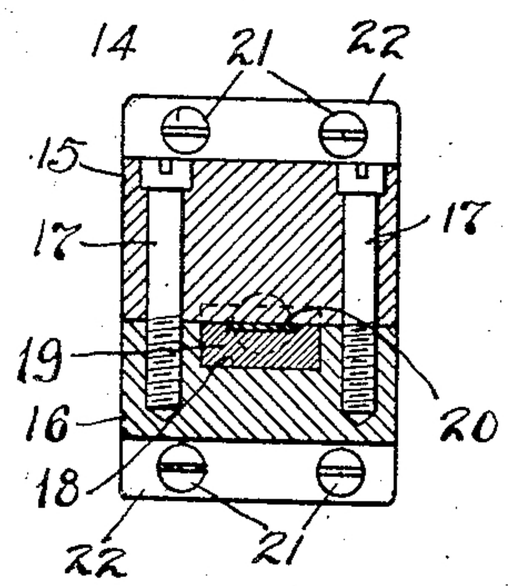

FIG. 6

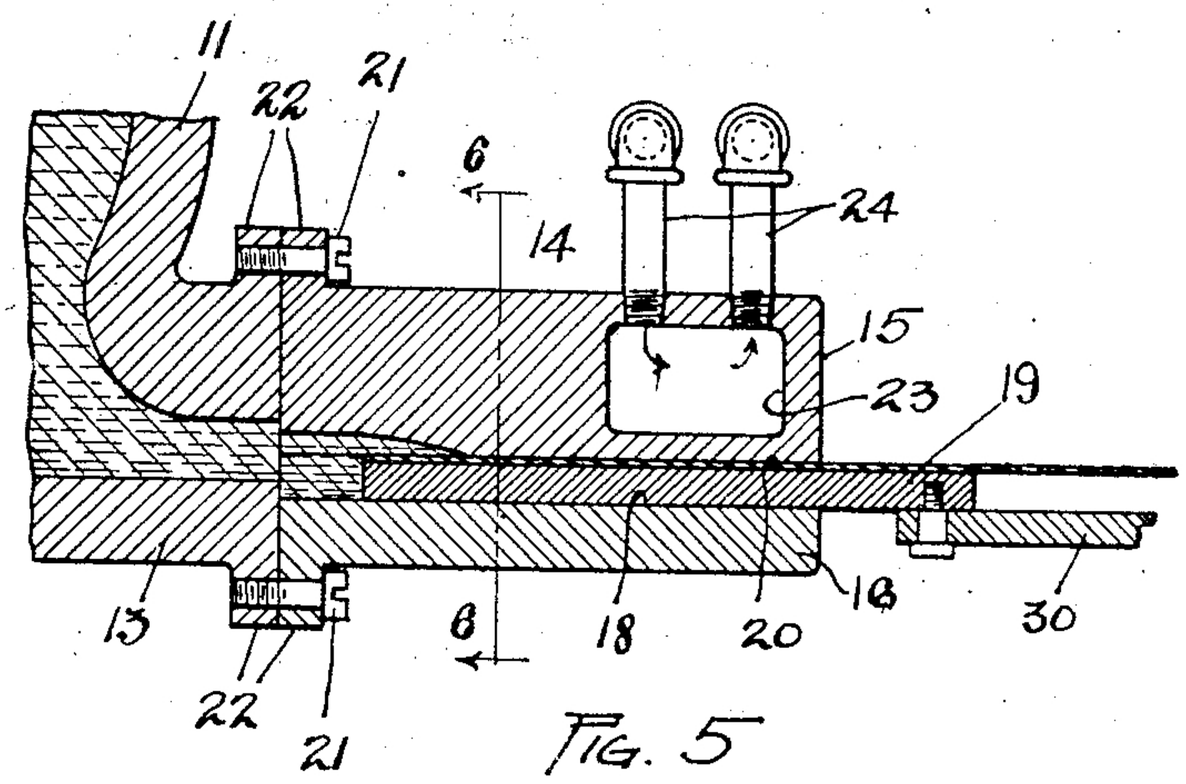

FIG. 5

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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR FORMING METAL STRIPS.

1,344,577. Specification of Letters Patent. Patented June 22, 1920.

Application filed September 13, 1918. Serial No. 253,914.

To all whom it may concern:

Be it known that I, CLAIR H. BRASTED, a citizen of the United States, and a resident of East Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Methods of and Apparatus for Forming Metal Strips, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present improvements relate more particularly to the production of metal strips in the form known in the printing art as rules, leads and the like, the object of the invention being to provide a method of and apparatus for forming strips of this sort in an expeditious and economical manner from the metal that is ordinarily employed in casting type-bars or slugs for printing. By being able to produce rules and leads at a low enough cost they may be re-melted, just as it is the current practice in linotype work to re-melt such type-bars or slugs and provide fresh material for each form. To the accomplishment of the foregoing and related ends, said invention, then, consists of the steps and means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain steps and mechanism embodying the invention, such disclosed steps and means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a side elevation, with certain parts shown in longitudinal vertical section, of my improved machine for forming metal strips of the kind in question; Fig. 2 is a transverse section of a portion of such machine, the plane of the section being indicated by the line 2—2, Fig. 1; Fig. 3 is partly an end view and partly a transverse cross-section of the same part, as indicated by the line 3—3, Fig. 1; Fig. 4 is a broken end elevation of other parts, as indicated by line 4—4, Fig. 1; Fig. 5 is a vertical longitudinal section of the casting nozzle forming a part of the machine, the plane of the section being the same as that of the parts shown in section in Fig. 1; and Fig. 6 is a transverse section of such nozzle, the plane of the section being indicated by the line 6—6 in Figs. 1 and 5.

The general frame of the machine may of course take on various forms, but is shown as a table 1 with suitable supporting legs or standards 2 at its respective ends. Journaled in suitable hangers 3, that depend from the table, is a main shaft 4 that carries suitable cams 5 and 6, as will be hereinafter described, also a countershaft 7 that carries a driving pulley 8, and is connected with said shaft 4 by means of a gear 9 and pinion 10.

Suitably supported on one end of the table 1 is a melting pot 11, beneath which is located a gas burner 12, or other suitable heating appliance, whereby a quantity of type metal may be maintained in molten condition in said pot. The latter is provided with a discharge spout 13 of more or less familiar form, to which is connected a casting nozzle 14 of special construction now to be described.

As best shown in Figs. 5 and 6, this nozzle is split in two in a horizontal plane, the parts 15 and 16 being securely held together by means of set screws 17, so as to form in effect an integral piece when assembled. The lower part 16 is provided on its upper face with a longitudinal recess 18 of rectangular form in cross-section, such recess communicating at the inner end of the nozzle with the opening in the spout 13. Closely fitted to, and reciprocably held in this recess is a plate or bar 19, the upper face of which is formed in turn with a smaller recess 20 of the cross-sectional form and dimensions of the strip which it is desired to produce. It will be seen that this reciprocable bar forms the bottom and side walls, which define the casting space, the upper walls of the latter being formed by the nozzle part 15. The assembled nozzle is attached to the spout by means of set bolts 21 passing through suitable flanges 22 on the contiguous ends of the nozzle and spout respectively, and the upper nozzle part is provided with a cooling chamber 23

adjacent its front end, to which water or the like may be supplied through suitable connections 24, as shown in Figs. 1 and 5.

Reciprocation of the bar 19 is effected from cam 5, which coöperates with a roller 25 on the lower end of a lever 26, the upper end of which has connection through a link 27 with a block 28 slidably held between parallel guides 29 mounted on the upper face of the table 1, (see Figs. 1, 2 and 3). This block is formed with a trough-like channel in its upper face, which serves to receive and guide the strip (not shown) as it projects from the nozzle, and is connected by a short link 30 with the forward end of the bar in question.

Adjacent the right-hand end of the guides 29, as illustrated in Fig. 1, is a relatively stationary clamping device, consisting of a fixed bed or anvil member 31, and a vertically reciprocable member 32 adapted to cooperate therewith. The latter is carried by a lever 33, which is in turn connected with cam 6 through the medium of a plunger 34 and another lever 35, the groove 36 in the cam being formed to retain the member 32 raised during approximately half of the rotation of the shaft 4, and to hold such member depressed during the other half-rotation. The timing of the cams 5 and 6 is such that said clamp member is held thus raised during the advance movement of the bar 19, *i. e.*, its movement to the right, as shown in Fig. 1, while said member is held in depressed position during the retraction of said bar, *i. e.* its movement to the left.

Having thus described my improved mechanism in detail, its mode of operation may be briefly set forth. Assuming the pot 11 to contain a sufficient quantity of molten type-metal, or other suitable metal, so as to be under a sufficient head to induce such metal to flow freely through the opening in the spout 13, it will be obvious that such metal will likewise enter into and flow along the recess 20 in upper face of the reciprocable slide 19 until a point is reached where it congeals or hardens, owing to the proximity of the cooling chamber 13 in the upper part of the nozzle. As a result of the location of such cooling chamber, the upper portion of the strip that is thus formed in the casting nozzle will cool a trifle in advance of the lower portion of such strip. The latter, being furthermore in contact on its bottom, as well as on its two lateral edges, with the recess in the bar, the advance movement of the bar will be effective to carry the strip with it. The molten metal of course follows in the main channel 18 formed in the lower nozzle part 16, and, when the limit of such advance movement is reached, the strip, assuming a portion to have been previously projected beyond the right-hand end of the bar 19, will be gripped between the fixed and movable members of the clamping device. These furthermore, remain closed pending the return movement of the bar, so that the portion of the strip that is carried on said bar beyond the end of the nozzle remains in this position. In the meantime the recess in the bar is filled throughout its entire extent by the molten metal, and that in the forward end of the recess is given an opportunity to congeal, so that, upon the bar again being advanced, such freshly congealed portion will be projected beyond the end of the nozzle. The clamping device is temporarily opened during this advance movement, to be closed again on the strip when the end of such movement is reached.

The continuation of the foregoing operation will obviously result in the formation of a continuous strip of indefinite length, such length being determined merely by the quantity of metal available in the pot. Such metal may of course be replenished, so as to keep up a constant supply as long as desired. In order to form a strip of different dimensions, it is merely necessary to disconnect the bar 19 from the reciprocating block 28, completely withdraw it from the nozzle and insert another bar having a recess in its upper face of the desired dimensions. The simplicity of the machine will be obvious, as well as the facility with which the change from one size of strip to another may be made.

By means of the disparity in the area of the contacting surfaces of the reciprocating bar and the upper part of the nozzle the strip will tend to stick to the bar and slide past the nozzle part. This tendency, as previously indicated, is further emphasized by having the cooling means adjacent such upper face of the strip which thus contacts with the upper nozzle part, the combined result being that the need of any special and complicated strip-pulling device is avoided.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means and the steps herein disclosed, provided those stated by any of the following claims or their equivalents be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In apparatus for forming a strip or the like directly from molten metal, the combination with a suitable supply of such metal; of a nozzle provided with a discharge opening of the same cross-section as the desired strip; and a member partially bounding such opening and reciprocable longitudinally of the same.

2. In apparatus for forming a strip or the like directly from molten metal, the

combination with a suitable supply of such metal; of a nozzle provided with a discharge opening of the same cross-section as the desired strip, a member partially bounding such opening and reciprocable longitudinally of the same; and means adapted to grip the end of a strip projecting from such opening.

3. In apparatus for forming a strip or the like directly from molten metal, the combination with a suitable supply of such metal; of a nozzle provided with a discharge opening of the same cross-section as the desired strip, a member partially bounding such opening and reciprocable longitudinally of the same; means adapted to reciprocate said member; means adapted to grip the end of a strip projecting from such opening; and means adapted to actuate said gripping means pending the retraction of said member.

4. In apparatus for forming a strip or the like directly from molten metal, the combination with a suitable supply of such metal; of a nozzle provided with a discharge opening of the same cross-section as the desired strip, and a member reciprocable longitudinally of such opening and bounding the larger portion thereof.

5. In apparatus for forming a strip or the like directly from molten metal, the combination with a suitable supply of such metal; of a nozzle provided with a discharge opening of the same cross-section as the desired strip; and a member partially bounding such opening and reciprocable longitudinally of the same, said nozzle being formed with a cooling chamber opposite the portion of such opening thus bounded by said member.

6. In apparatus for forming a strip or the like directly from molten metal, the combination with a suitable supply of such metal; of a nozzle provided with a discharge opening of the same cross-section as the desired strip, and a member reciprocable longitudinally of such opening and bounding the larger portion thereof, said nozzle being formed with a cooling chamber opposite the portion of such opening thus bounded by said member.

7. In apparatus for forming a strip or the like direct from molten metal, the combination with a suitable supply of such metal; of a nozzle having a longitudinally extending opening; and a member reciprocable in such opening and formed with a longitudinally extending recess providing a discharge opening of the same cross-section as the desired strip.

8. In apparatus for forming a strip or the like direct from molten metal, the combination with a suitable supply of such metal; of a nozzle having a longitudinally extending opening; and an interchangeable member reciprocable in such opening and formed with a longitudinally extending recess providing a discharge opening of the same cross-section as the desired strip.

9. In apparatus for forming a strip or the like direct from molten metal, the combination with a suitable supply of such metal; of a nozzle having a longitudinally extending opening; and a member reciprocable in such opening and formed with a longitudinally extending recess providing a discharge opening of the same cross-section as the desired strip, said nozzle being formed with a cooling chamber opposite the recess in said member.

10. In apparatus for forming a strip or the like direct from molten metal, the combination with a suitable supply of such metal; of a nozzle having a longitudinally extending opening; and an interchangeable member reciprocable in such opening and formed with a longitudinally extending recess providing a discharge opening of the same cross-section as the desired strip, said nozzle being formed with a cooling chamber opposite the recess in said member.

11. The method of forming a strip or the like directly from molten metal which consists in casting a section of such strip between two complementary mold-parts; and then moving one mold-part relatively to the other, said parts being formed to leave such strip-section more closely attached to the part thus moved than to the other, so as to be carried along therewith.

12. The method of forming a strip or the like directly from molten metal which consists in casting a section of such strip between two complementary mold-parts; and then moving one mold-part relatively to the other, the part thus moved bounding the larger portion of such strip, so as to carry the same therealong.

13. The method of forming a strip or the like directly from molten metal which consists in casting a section of such strip between two complementary mold-parts; and then moving one mold-part relatively to the other; and cooling the portion of such strip disposed toward the stationary mold-part more rapidly than that disposed toward the movable mold part.

14. The method of forming a strip or the like directly from molten metal which consists in casting a section of such strip between two complementary mold-parts; and then moving one mold-part relatively to the other, the part thus moved bounding the larger portion of such strip, so as to carry the same therealong; and cooling the portion of such strip disposed toward the stationary mold-part more rapidly than that disposed toward the movable mold-part.

Signed by me, this 16th day of August, 1918.

CLAIR H. BRASTED,