March 15, 1932. F. R. HALL 1,850,010

APPARATUS FOR CUTTING METAL BARS

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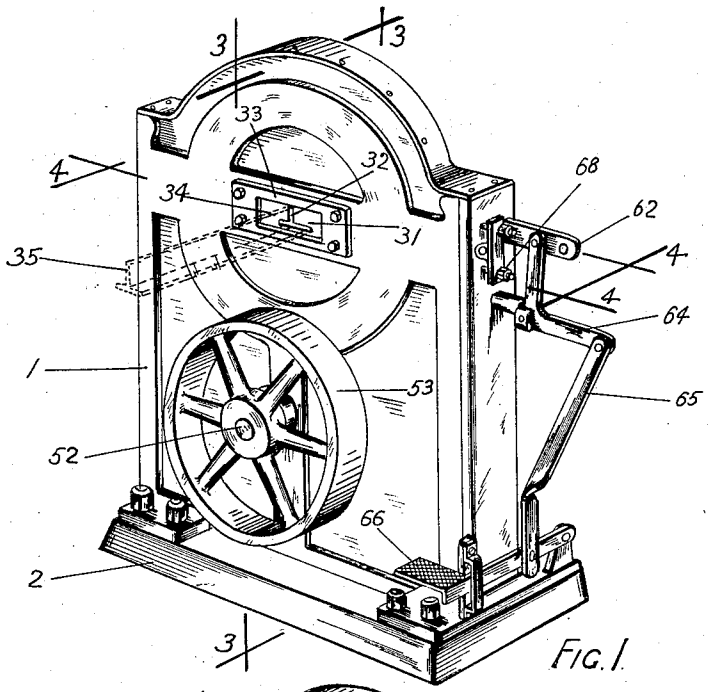


FIG. 1.

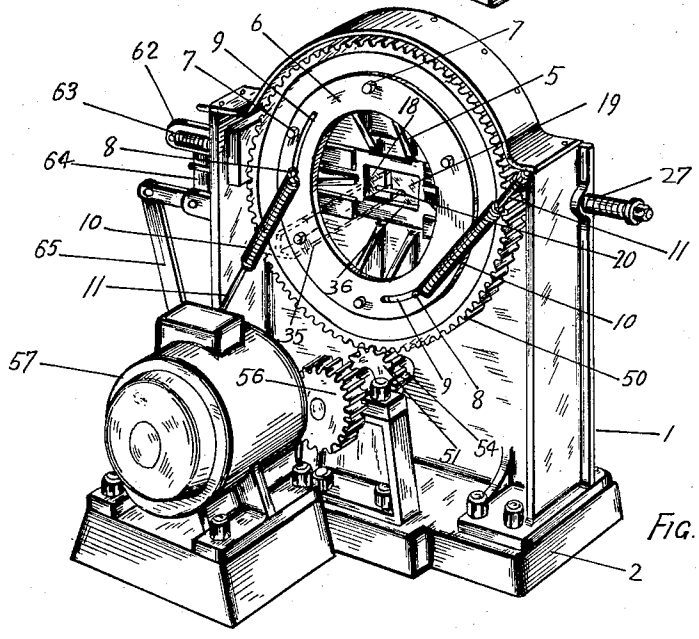


FIG. 2.

F. R. Hall
INVENTOR

By: Marks & Clark
Attys.

March 15, 1932. F. R. HALL 1,850,010

APPARATUS FOR CUTTING METAL BARS

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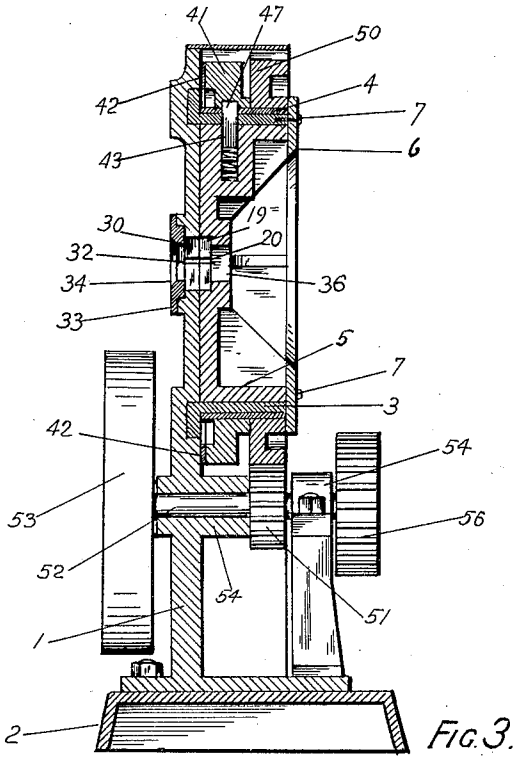


Fig. 3.

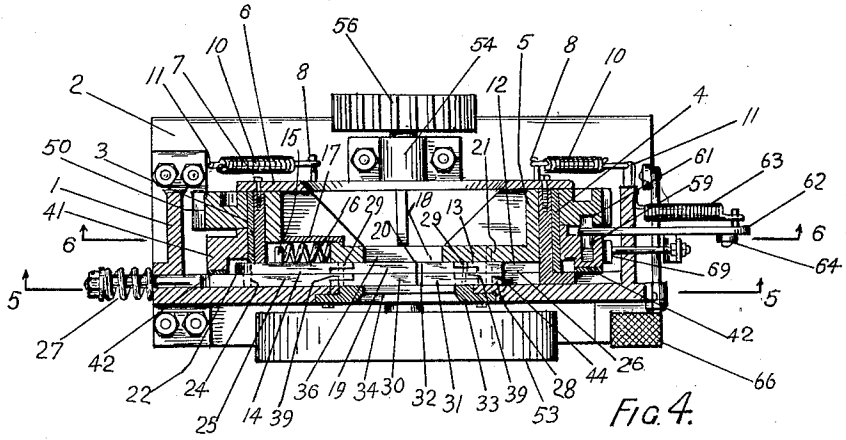


Fig. 4.

H. R. Hall
INVENTOR

BY: Marks & Clerk
Attys.

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APPARATUS FOR CUTTING METAL BARS

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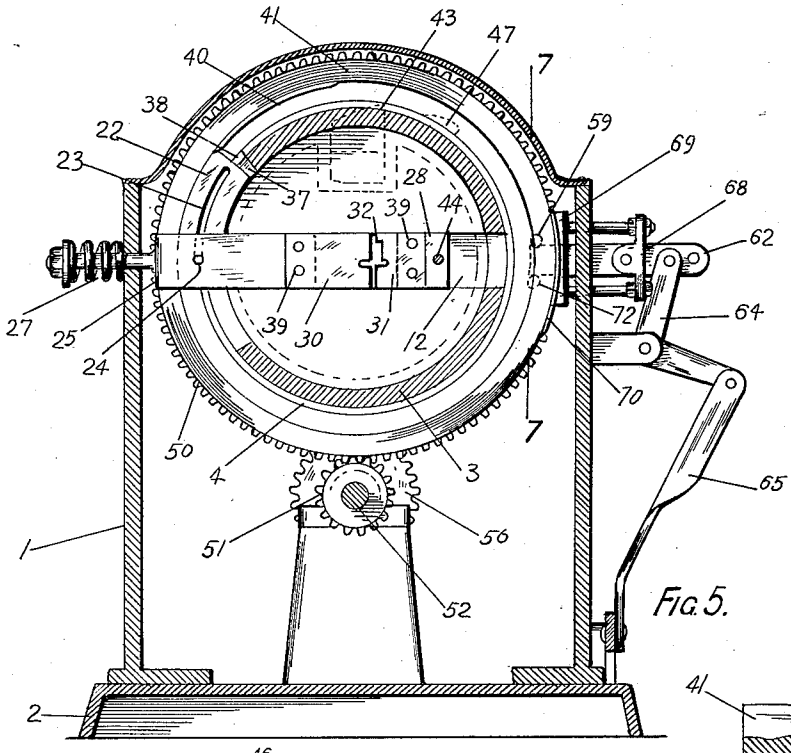


Fig. 5.

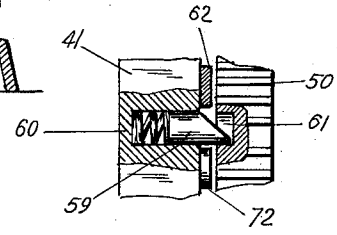


Fig. 7.

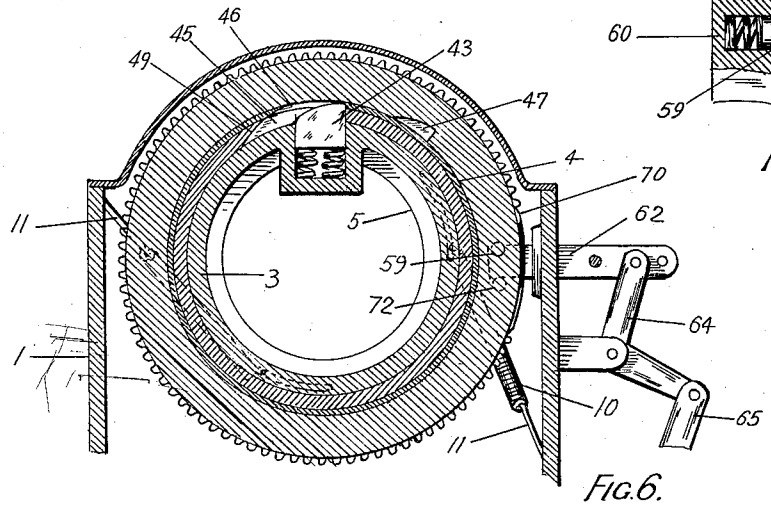


Fig. 6.

F. R. Hall
INVENTOR

By: Marks & Clark
ATTYS.

March 15, 1932. F. R. HALL 1,850,010

APPARATUS FOR CUTTING METAL BARS

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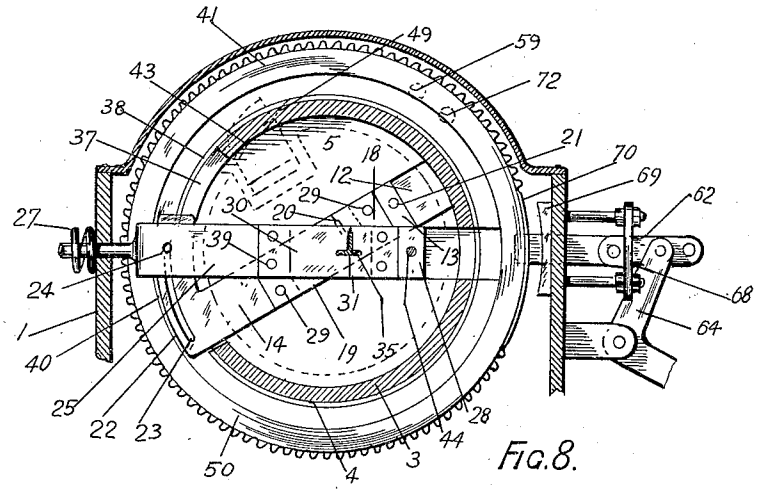


FIG. 8.

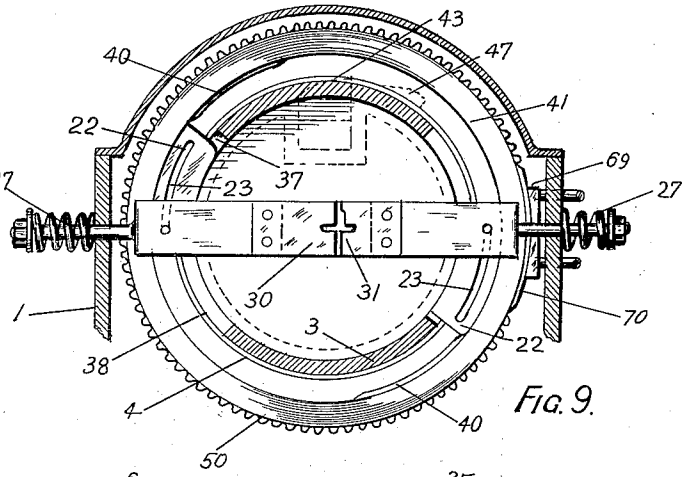


FIG. 9.

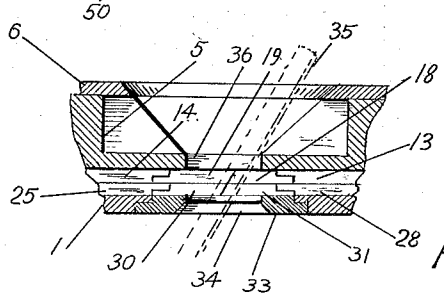


FIG. 10.

F. R. Hall
INVENTOR

By: Marks & Clerk
Attys.

Patented Mar. 15, 1932 1,850,010

UNITED STATES PATENT OFFICE

FREDERICK ROBERT HALL, OF ARNCLIFFE, NEAR SYDNEY, NEW SOUTH WALES, AUSTRALIA

APPARATUS FOR CUTTING METAL BARS

Application filed August 20, 1929, Serial No. 387,177, and in Australia May 13, 1929.

This invention relates to apparatus for cutting metal bars whether they are of T, H, Z, or channel, or any other shape in cross-section; the cut face of the bars may be straight or it may be of mitre or any other angular cut.

Referring to the accompanying drawings, Fig. 1 is a perspective front view of the apparatus; Fig. 2 is a perspective back view of the apparatus; Fig. 3 is a sectional elevation on plane 3—3, Fig. 1; Fig. 4 is a sectional plan on plane 4—4, Fig. 1; Fig. 5 is a sectional elevation on line 5—5, Fig. 4; Fig. 6 is a sectional view on line 6—6, Fig. 4; Fig. 7 is a sectional view on line 7—7, Fig. 5; Fig. 8 is a sectional view similar to Fig. 5; Fig. 9 is a sectional view also similar to Fig. 5 but showing a modification in the die assemblage; Fig. 10 is a sectional view illustrating the mitre cutting of a bar.

The apparatus is provided with a main frame 1 which is mounted upon a bed plate 2; said main frame 1 has rigidly affixed thereto a cylindrical hollow boss 3 having affixed thereto a metal bush 4. The hollow boss 3 forms a bearing for the rotatable rotor 5. Such rotor 5 is held within the boss 3 by the annular ring 6, which is rigidly secured to the boss 3 by the screw bolts 7. The rotor 5 is also provided with a pair of lugs 8 (Figs. 2 and 4) which are adapted to project through segmental slots 9 in the annular ring 6; each of the lugs 8 is connected to one end of the tensioned coil springs 10, whose other ends are connected to rods 11 adjustably anchored to the main frame 1.

In the front face of the rotor 5 is a grooved raceway 12 in which are mounted a pair of blocks 13 and 14 (Fig. 4); the block 13 is rigidly fixed by pin 21 in the raceway 12, and the block 14 is slidable in such raceway 12 and has a projecting lug 15 (see Fig. 4) which abuts a compressible coil spring 16 in a housing 17 contained in the rotor 5. Each of the blocks 13 and 14 has affixed thereto by pins 29 the die blocks 18 and 19, which die blocks when brought together form one complete die, and have their contiguous edges fashioned to provide a through opening 20 which corresponds with the cross-section of a metal bar to be cut.

Slidable block 14 has a sector arm 22 having a sector slot 23 adapted to receive a pin 24 which is fixed to a block 25 slidable in the grooved raceway 26 formed in the main framing 1; the block 25 is provided with a compressible coil spring 27. In this raceway 26 is also fixedly mounted by pins 44 another block 28; both the blocks 25 and 28 carry die blocks 30 and 31 through pins 39 which die blocks when placed together also form one complete die block, similar to the die blocks 18 and 19, and having a through opening 32 corresponding to the cross section of a metal bar to be cut. The through openings 20 and 32 will be in alignment with one another when the whole of the die blocks are in the same plane. The die blocks may be interchanged upon removing the face plate 33 from the framing 1; such face plate 33 has a through opening 34 to enable a metal bar 35 (Fig. 1) to be placed through the through openings of the die blocks. The rotor 5 has a through opening 36 to enable the metal bar to be passed therethrough from the die blocks.

The contiguous faces of each of the die blocks 18, 19, 30 and 31 are maintained in firm contact during the cutting of a bar whereby a clean shear cut may be obtained. The through openings 20 and 32 formed in the die blocks are preferably set eccentric to the centre axis of the rotor 5 to ensure a clean shear cut of the bar.

Sector arm 22 of the block 14 is adapted to pass through a sector slot 37 and 38 respectively in the boss 3 and the metal bush 4 and is adapted to engage with a ramp 40 carried on the interior face of the recessed rotatable ring 41. The latter ring abuts the removable liner 42 and said ring 41 has bearing on the metal bush 4 carried by the fixed boss 3.

Rotor 5 has a spring ratchet tooth 43 (Fig. 6) which is adapted to pass through sector slots 45 and 46 respectively in the hollow boss 3 and metal bush 4 to engage with the recess 47 in the rotatable ring 41. Such sector slots 45 and 46 are provided with a ramp face 49 (Fig. 6) for the purpose of allowing

withdrawal of the ratchet tooth 43 from the recess 47 when required.

Mounted rotatably on the bush 4 of the boss 3 is the gear wheel 50, which gear wheel 50 meshes with a toothed pinion 51 fixed on the countershaft 52 carrying a fly wheel 53 and having bearings 54 secured to the bed plate 2. The shaft 52 also has fixed thereto toothed pinion 56 (Figs. 2, 3 and 4) which meshes with a gear wheel (not shown) on the shaft of an electro-motor 57. While the shaft 52 of the motor 57 is rotating the gear wheel 50 will be constantly rotated.

Said gear wheel 50 is adapted to be clutch connected to the rotatable ring 41 by a spring pressed bolt 59 (see Figs. 4 and 7) which has a bevel face and is slidable in an opening 60 in the ring 41; when the bolt 59 is allowed to project into the opening 61 of the gear wheel 50 the ring 41 will be rotated with the gear wheel 50.

To withdraw the spring bolt 59 from engagement with the gear wheel 50, a slider 62 is provided which is slidably mounted on the main framing 1 and has a tensioned expansible coil spring 63 (Figs. 1 and 4) one end of which is anchored to the main framing 1 and the other to the slider 62. This slider 62 is operable by a bell crank lever 64 connected by a link 65 to a foot pedal 66. Associated with the slider 62 is a bearing bracket 68; such bracket carries a brake shoe 69 adapted to engage with a brake lining 70 mounted on the outer face of the rotatable ring 41. Normally the spring 63 operates to keep the slider 62 in proper position to prevent the bolt 59 from engaging with the gear wheel 50.

Both the rotatable ring 41 and the gear wheel 50 are maintained upon the bush 4 by the said annular disc 6.

The rotatable ring 41 is provided with a brake stop 72.

To declutch the ring 41 from the gear wheel 50 the slider 62 is forced across the path of the bolt 59 in relation to the recess 61 by the coil spring 63. As the slider 62 contacts with the bevel face of the spring bolt 59 the latter will be withdrawn from engagement with the recess 61 of the gear wheel 50, and the slider 62 will also block the stop 72 on the rotatable ring 41 thus preventing further rotation of the ring 41. To reduce jar owing to sudden contact of the slider 62 with the stop 72 the brake shoe 69 engages in advance with the brake lining 70 mounted on the outer face of the rotatable ring 41.

When it is desired to clutch connect the rotatable ring 41 to the gear wheel 50, the foot pedal 66 is depressed whereby the slider 62 is withdrawn, thus allowing the spring bolt 59 to enter the opening 61 in the gear wheel 50, and simultaneously the brake shoe 69 will be released from contact with the rotatable ring 41.

Referring to Fig. 9, the fixed blocks 13 and 28 carrying the die blocks 18 and 31 are made slidable and they are connected up in a manner similar to that hereinbefore described. The rotatable ring 41 is, however, provided with two ramps 40, otherwise the construction and operation are similar to that before described.

Referring to Fig. 10, herein is illustrated how a metal bar 35 is adapted to be mitre cut, the through openings 20 and 32 in the die blocks being set to an angle corresponding to the angle of the mitre cut desired.

In operation, and to permit cutting of a metal bar the foot pedal 66 is in released position, the gear wheel 50 will be in constant rotation, but the rotor 5 will be stationary and the die blocks 18, 19, 30 and 31 will be opened out (Fig. 5) and the through openings 20 and 32 will be in alignment; a metal bar 35 may then be inserted in the said openings to the predetermined distance required. On depressing the foot pedal 66 the rotatable ring 41 will be set in motion through being clutch connected by the spring bolt 59 engaging with the gear wheel 50. As the ring 41 rotates the ratchet tooth 43 will engage with the recess 47 in the rotatable ring 41 and thus the rotor 5 will be rotated and the ramp 40 will engage with the sector arm 22 and thus close up the die blocks 18, 19, 30 and 31, whereby the inserted bar may be firmly held in position while it is being cut at a point between the contiguous faces of the die blocks. By the time the bar has been cut the ratchet tooth 43 of the rotor 5 will have reached ramp 49 and be withdrawn from engagement with the recess 47 in the rotatable ring 41 by the ramp 49 in the sector slots 37 and 38 (see Fig. 8). Such action allows the rotatable ring 41 to continue to rotate but the rotor 5 will be brought to normal position by the coil springs 10 and allow the die blocks 18, 19, 30 and 31 to open out and thus the metal bar will be enabled to be freely manipulated. On releasing the foot pedal 66 the rotatable ring 41 will be brought to stationary position as the spring bolt 59 will be withdrawn from engagement with the gear wheel 50, and the brake shoe 69 will be operated into contact with the brake lining 70 on the rotatable ring 41.

What I claim as my invention and desire to secure by Letters Patent is:—

1. Apparatus for cutting metal bars comprising a framing, a rotor within said framing, a pair of cutter die elements associated with the rotor, a pair of complementary cutter die elements associated with said framing, means for driving said rotor, means for effecting opening or closing of said cutter die elements, clutch connections between said rotor and drive means, automatic means for

disconnecting said clutch connections after predetermined rotary movement of the rotor, and means for restoring the rotor to its initial position.

2. Apparatus for cutting metal bars according to claim 1, in which a constantly rotated gear wheel is associated with the rotor, a rotatable ring also associated with the rotor, both said gear wheel and ring being carried on the framing, and clutch connections between the ring and gear wheel and between the ring and the rotor.

3. Apparatus for cutting metal bars in accordance with claim 1, wherein the driving means includes a constantly rotated gear wheel associated with the rotor, and a ring also rotatably associated with the rotor, clutch connections between the ring and gear wheel and between the ring and rotor respectively and wherein the means for effecting opening and closing movement of the die elements are associated with the rotor and ring and with each set of said elements.

4. Apparatus for cutting metal bars comprising a main framing, a rotatable power driven shaft on said framing, a gear pinion on said shaft, a gear wheel rotatably mounted on said framing and meshing with said pinion, a ring rotatably mounted with respect to the said gear wheel, a rotor rotatably mounted on said framing and associated with the rotatable ring to be rotated at intervals with said ring, manually operable clutch means for drive connecting said ring with said gear wheel, a pair of cutter die elements associated with said rotor, a pair of complementary cutter die elements associated with said framing, and means for effecting opening or closing of said cutter die elements.

5. Apparatus for cutting metal bars according to claim 4, in which a hollow boss is fixed to framing, and a bush is mounted on the circumference of said boss, the rotatable ring and the rotatable gear wheel being mounted on said bush, and the rotor being mounted within the hollow boss.

6. Apparatus for cutting metal bars according to claim 4, in which the pairs of cutter die elements are respectively carried in raceways in the front portion of the rotor and in the framing and consist of two sets of cutter die blocks two of such blocks being movable in said raceways and spring pressed and one of such blocks being fixed to said rotor in said raceway and the other being fixed in the raceway in said framing, a sector arm on one of said movable die blocks with sector slot therein, the said sector arm being adapted to project through a sector opening in the hollow boss and bush respectively, a pin on the other movable die block and slidable in said sector slot, and a ramp on the interior face of the rotatable ring with which said sector arm is adapted to contact to close said cutter die elements to cut a metal bar during rotation of the rotor.

7. Apparatus for cutting metal bars according to claim 4, in which the rotatable ring has a sector slot, and the rotor has a spring pressed projecting tooth, and the hollow boss and the bush have sector openings therein to allow the said tooth to project therethrough to engage with the sector slot in the rotatable ring when the latter is rotating whereby the rotor will be arcuately moved with the rotatable ring, and a ramp at one end of the sector slots in the hollow boss and bush to permit automatic disconnection of the said projecting tooth with the rotatable ring when the rotor is to be disconnected from the rotatable ring.

8. Apparatus for cutting metal bars according to claim 4, in which the cutter die elements include movable and fixed portions, and spring means associated with the movable portions and in which a pair of expansible coil springs are provided and each have one of their ends fitted to the rotor while the other ends of such springs are connected to the main framing, the said springs being adapted to return the rotor to normal position thereof after its disconnection from the rotatable ring whereby the movable portion of the cutter die elements will be openable from the fixed portion of said elements through the operation of the spring means associated with the movable portion of the said cutter die elements.

9. Apparatus for cutting metal bars according to claim 4, in which the means for clutch connecting the rotatable ring with the rotatable gear wheel consists of a spring pressed bolt associated with the rotatable ring, and pedal means associated with the main framing, a slider engaging the bolt and pivotally associated with said pedal means, an expansible coil spring for keeping the slider in contact with the bolt to place the bolt out of engagement with said rotatable gear wheel, a stop on the rotatable ring for the said slider, a brake lining on the ring, a brake shoe on the slider adapted normally to contact with the brake lining on the outer face of the said rotatable ring through the expansible spring associated with the slider, the said slider and brake shoe being capable of operation conjointly to allow the spring pressed bolt to automatically engage with the rotatable gear wheel when the pedal means are depressed to permit the slider to be disengaged from the said bolt.

10. Apparatus for cutting metal bars according to claim 4, in which the cutting faces of the cutter die elements are set to an angle for the purpose of effecting mitre cutting of the metal bar.

In testimony whereof I affix my signature.

FREDERICK ROBERT HALL.