

G. GORTON.
METAL CUTTING-OFF MACHINE.
APPLICATION FILED AUG. 28, 1909.

1,063,789.

Patented June 3, 1913.

9 SHEETS—SHEET 1.

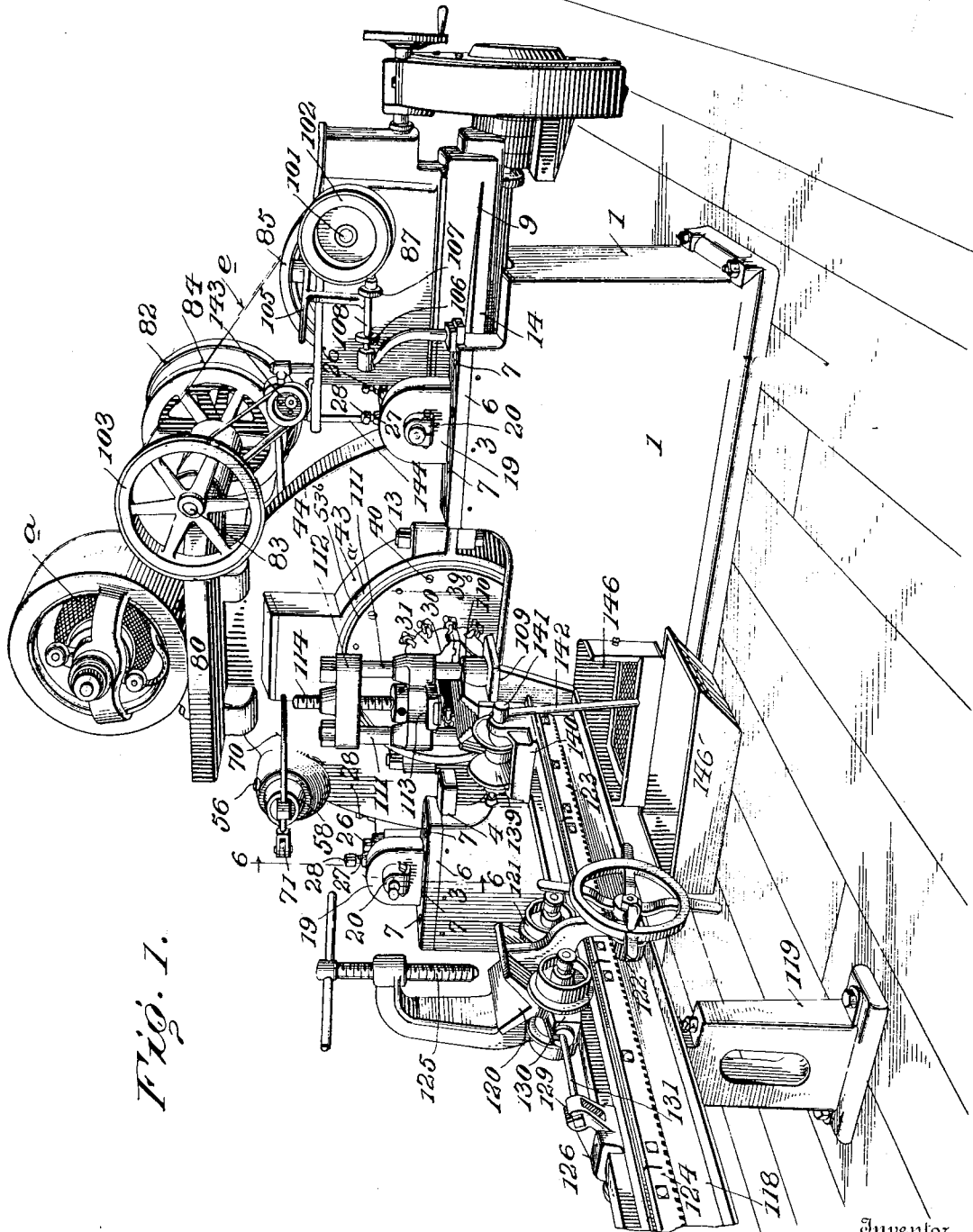


Fig. 1.

Witnesses

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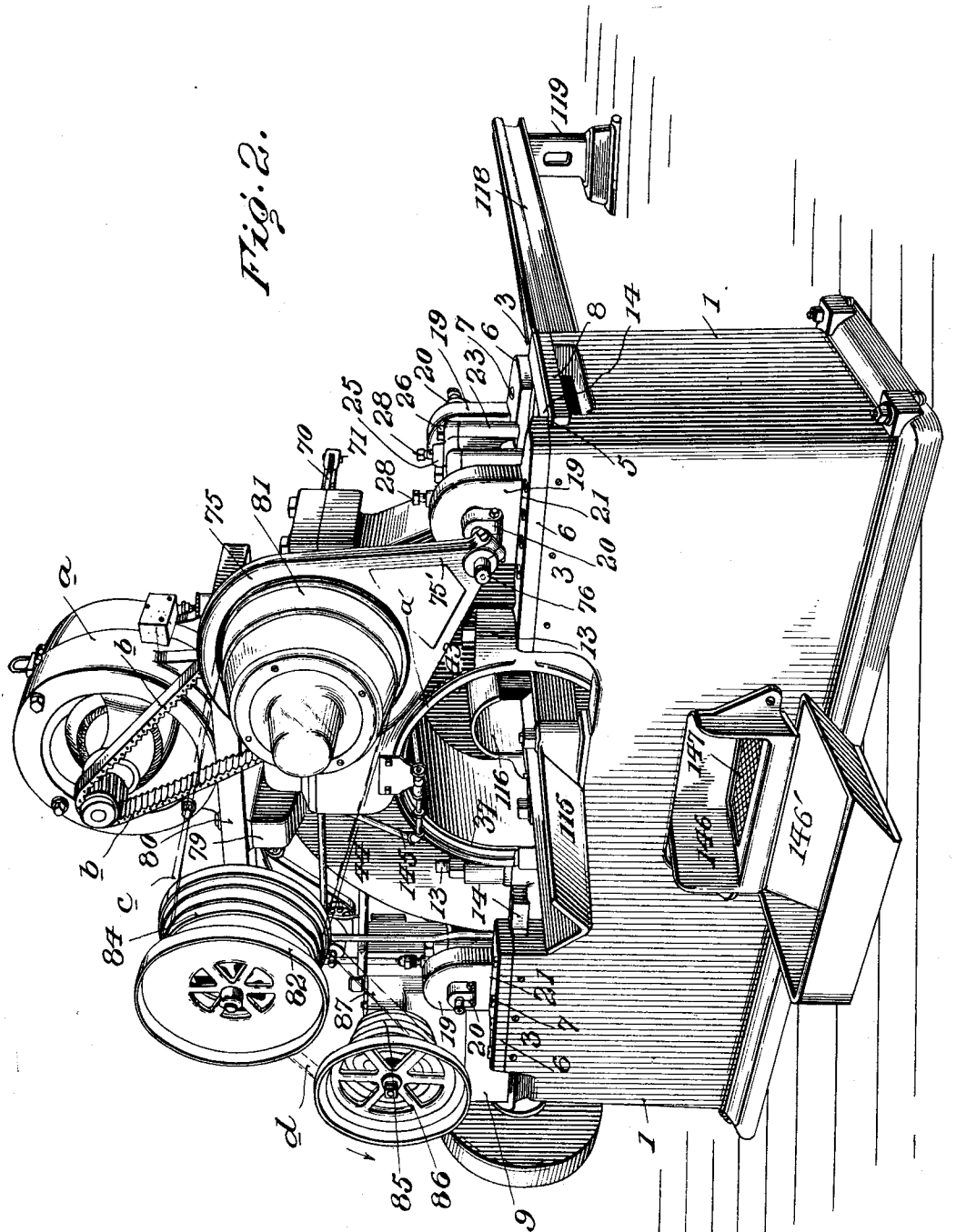
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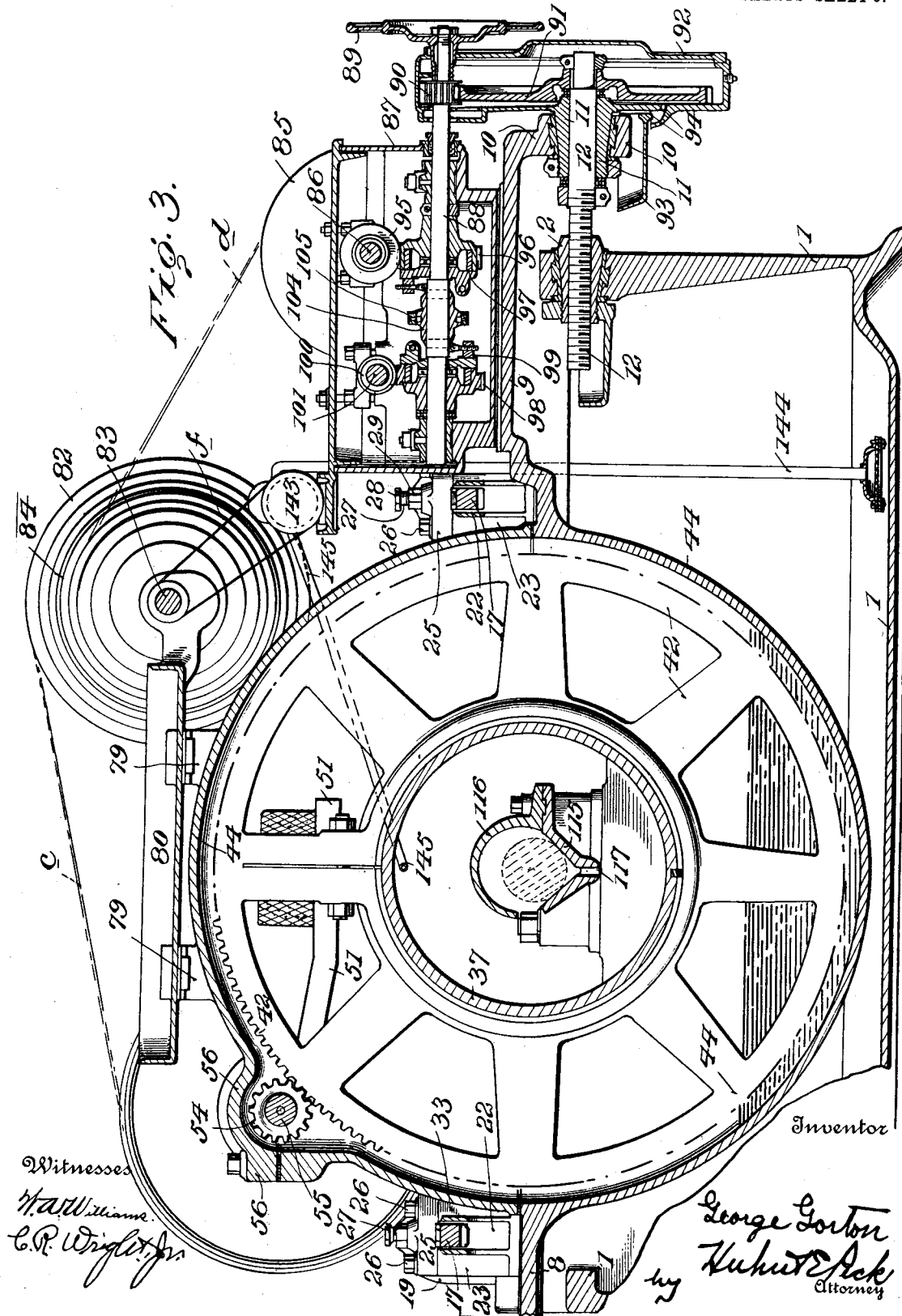
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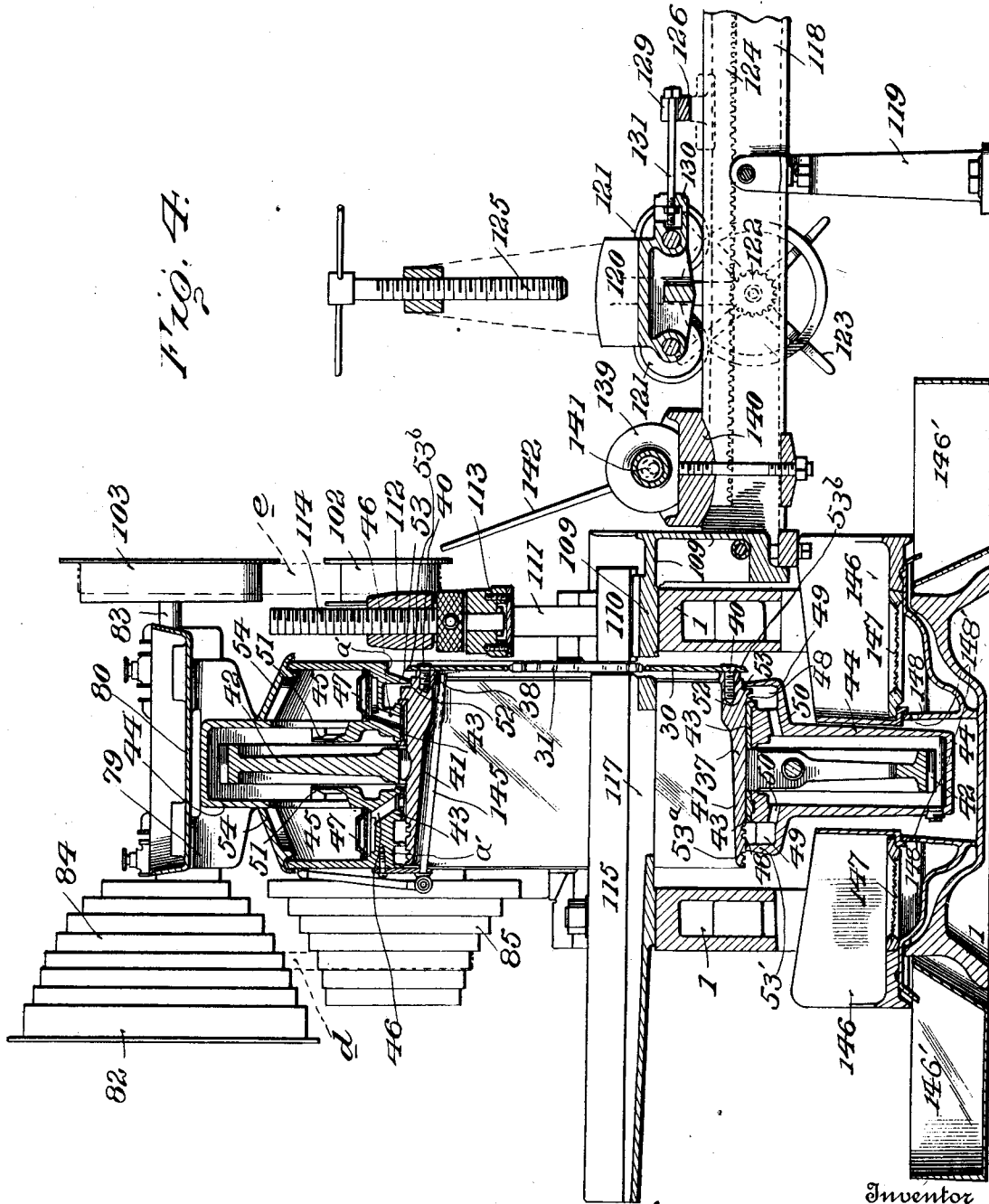


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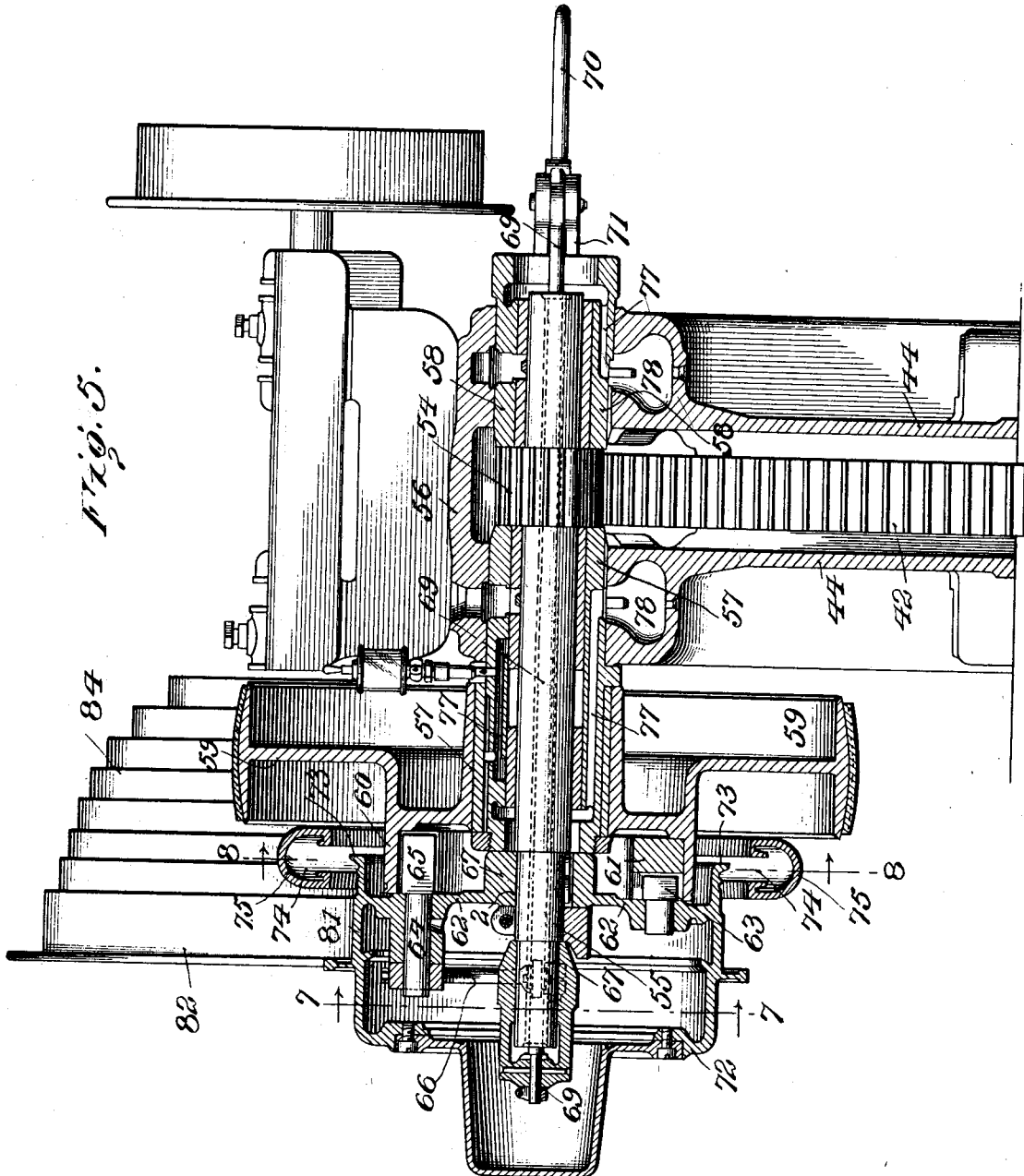
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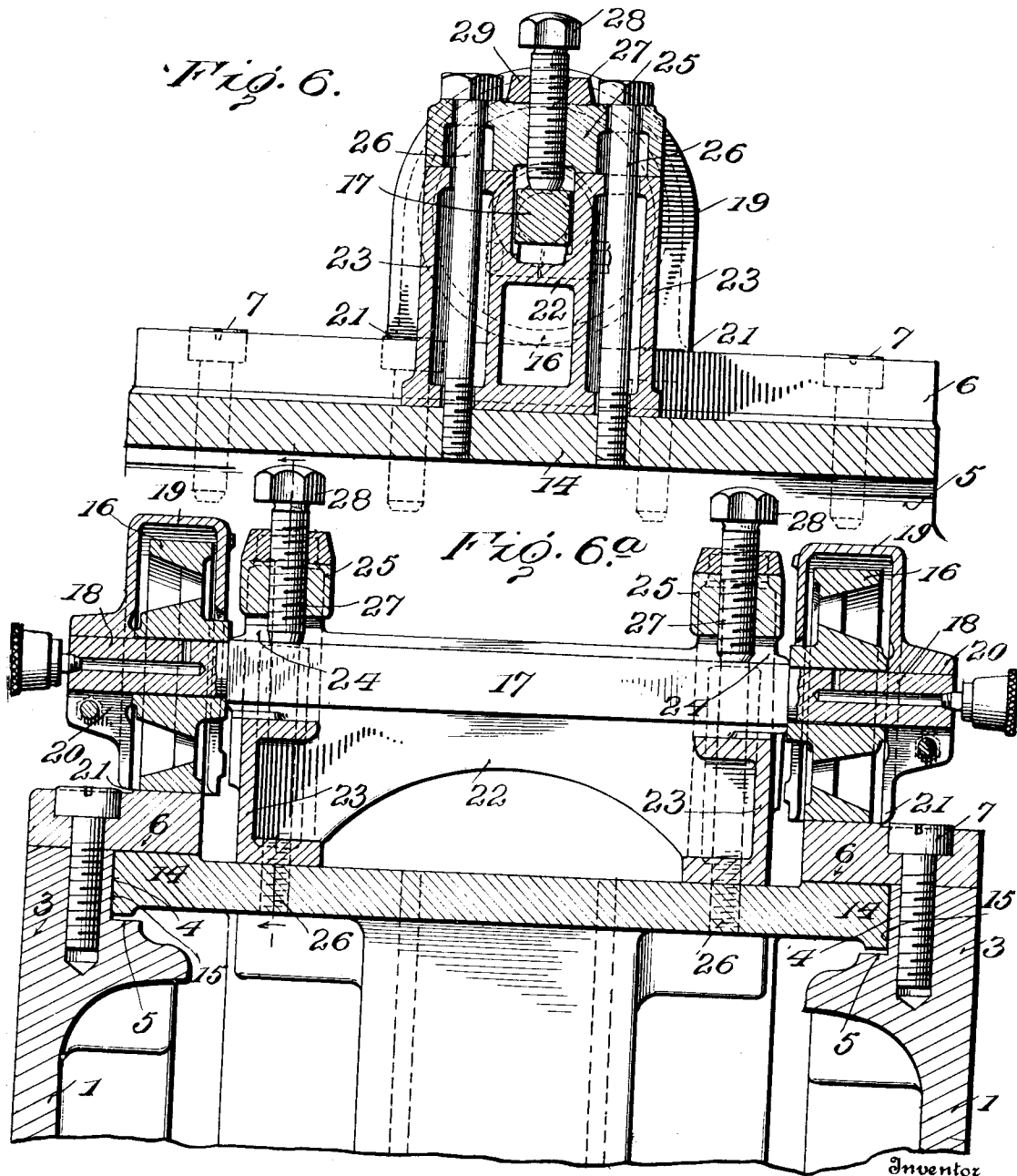
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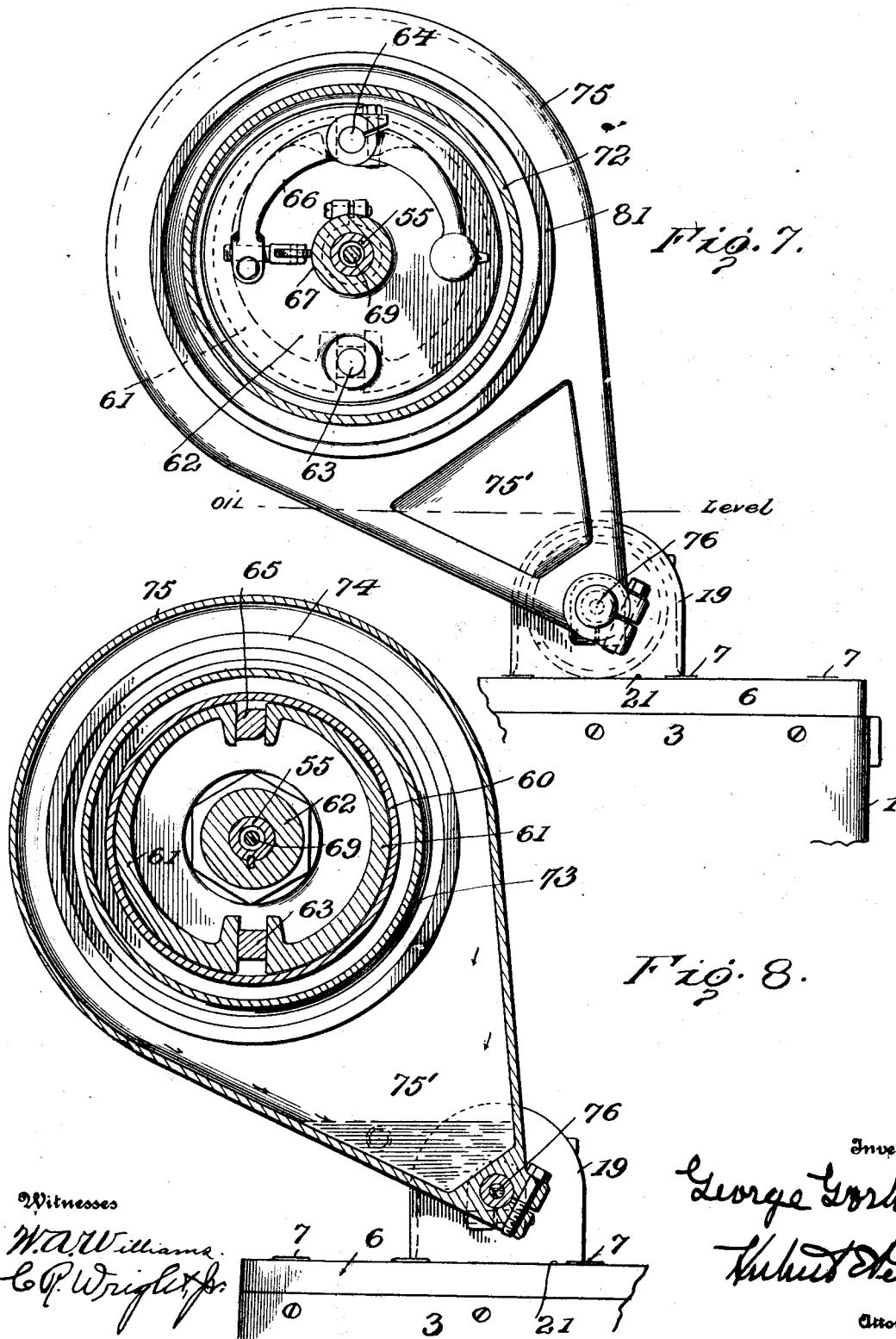
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9 SHEETS—SHEET 7.

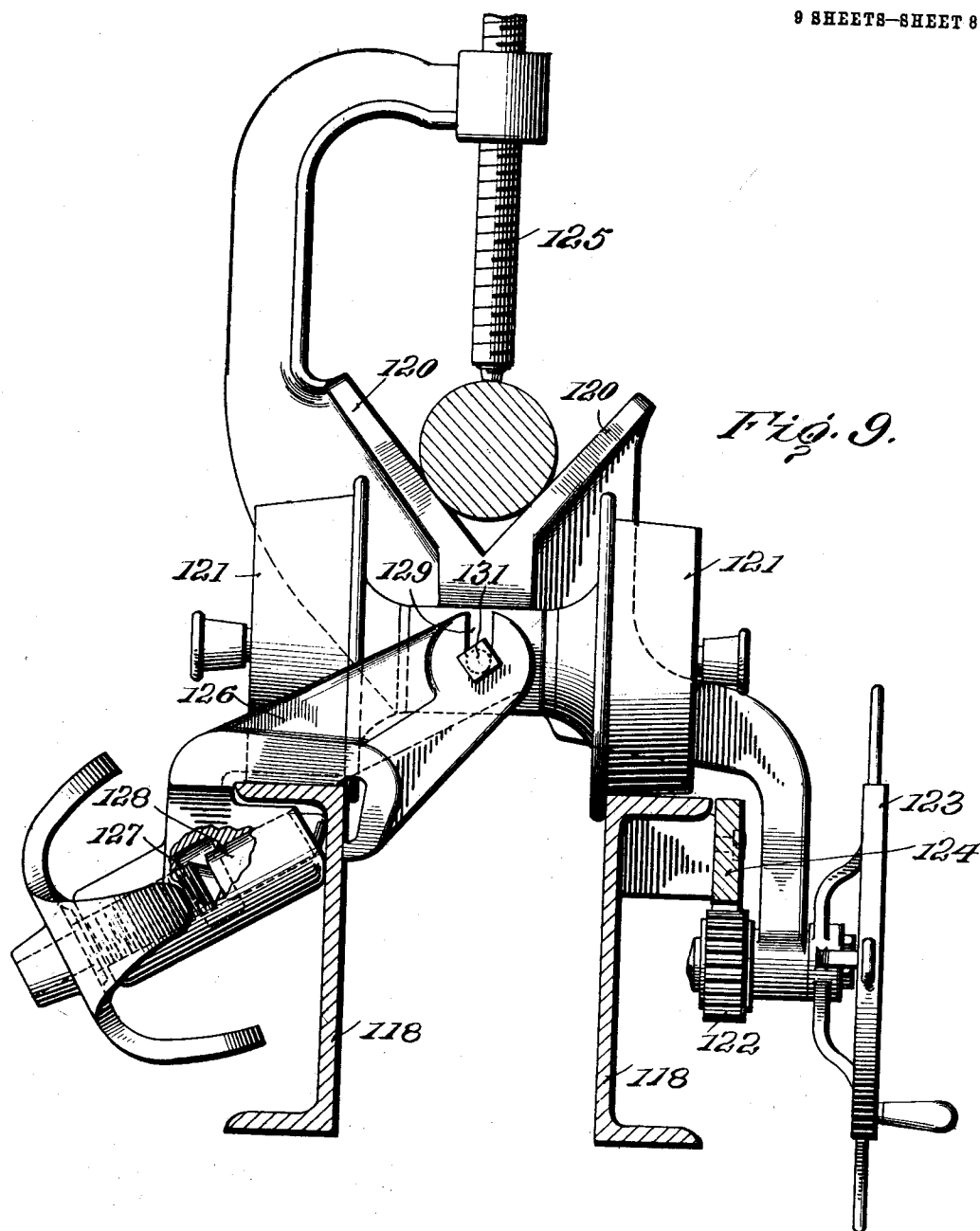


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9 SHEETS—SHEET 8.



Witnesses
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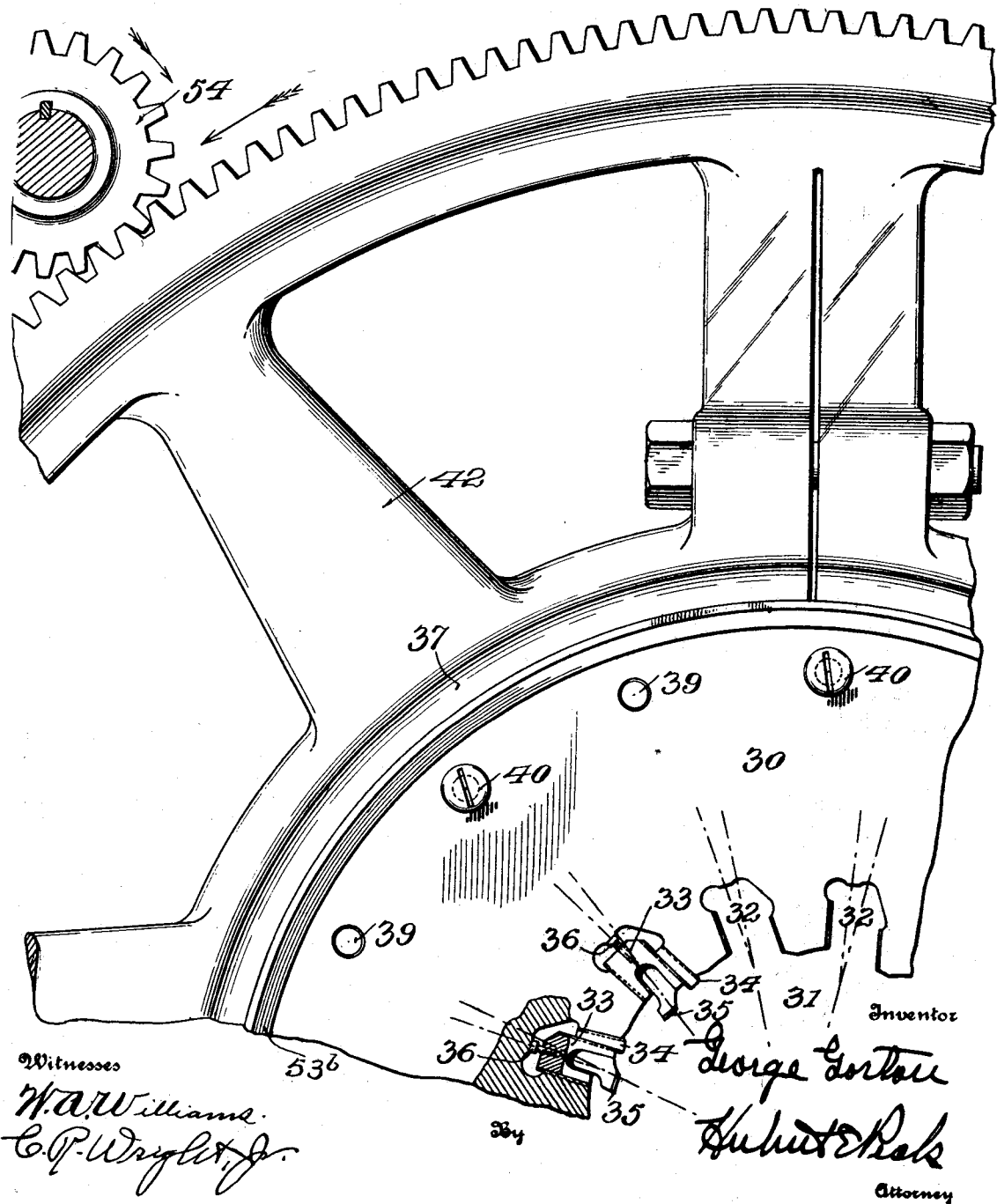
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9 SHEETS—SHEET 9.

Fig. 10.



UNITED STATES PATENT OFFICE.

GEORGE GORTON, OF RACINE, WISCONSIN.

METAL-CUTTING-OFF MACHINE.

1,063,789.

Specification of Letters Patent.

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Application filed August 28, 1909. Serial No. 515,023.

To all whom it may concern:

Be it known that I, GEORGE GORTON, a citizen of the United States, residing at Racine, Racine county, Wisconsin, have invented certain new and useful Improvements in Metal-Cutting-Off Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in cutting off machines; and the objects and nature of my invention will be readily understood by those skilled in the art in the light of the following explanation of the accompanying drawings illustrating what I now consider preferred embodiments from among other constructions, arrangements and combinations within the spirit and scope of my invention.

Referring to the accompanying drawings:—Figure 1 is a front perspective view of the cutting off machine. Fig. 2 is a rear perspective thereof. Fig. 3 is a central vertical longitudinal section through the machine taken in the direction of the line of feed and transversely of the axis of rotation of the cutting blade or disk. Fig. 4 is a vertical section transversely through the machine and centrally through the cutter blade drum and in the plane of the axis of rotation thereof, the stock shield on the trough in rear of the cutter blade, not being shown. Fig. 5 is a vertical section through a portion of the machine, taken in the plane of the axis of rotation of the driving pinion shaft and the driving clutch thereon, and showing a belt for driving the main driving pulley, different from that illustrated in Fig. 2. Fig. 6, is a detail section taken longitudinally of the feed carriage through means for supporting and adjusting the same. Fig. 6*, is a detail cross section taken in the plane of the line 6—6, Fig. 1. Figs. 7 and 8, are detail sectional views particularly illustrating details of the main clutch, said views being taken respectively on the lines 7—7, and 8—8, Fig. 5. Fig. 9, is a detail vertical cross section through the trolley track showing the stock feeding trolley movable thereon. Fig. 10, is a detail view enlarged, showing portions of the cutter blade and its insertible cutters and driving means.

The machine of this invention is particularly designed for cutting off or severing

into lengths bars of steel or other metal and is peculiarly adapted for cutting off heavy or thick bars of steel at a comparatively high rate of speed, although all features of my invention are not limited to such application.

Generally speaking, the machine comprises a strong or heavy base, a movable feed carriage supported thereby and usually carrying the working parts of the machine and the driving and transmission gearing and a rotating cutter blade or disk having a central opening surrounded by the cutters; and means are provided for supporting and holding the work while being operated upon by the cutters.

In the specific example illustrated, I show a strong heavy base 1, in the form, generally, of a horizontally elongated or oblong box open at the top and forming a tank or receptacle. If so desired, this heavy base can be formed by a single hollow casting, although of course my invention is not so limited, nor is it limited to the particular form or arrangement of base shown. One end wall of the base is formed with an opening extending transversely therethrough to receive the nut 2, for the feed screw operating the carriage longitudinally of the base. The central top portions of the longitudinal or front and rear walls of the base are depressed opposite the cutter blade or disk for the reception of the devices for holding the work. The four top portions 3, of the longitudinal or side walls of the base, intervening between said central depressions and the end walls, are constructed or arranged to form longitudinal parallel horizontal track and slide ways for the reciprocating feed carriage and whereby the same is supported and maintained to reciprocation in its proper path of movement. These portions 3, are formed with longitudinal parallel inner vertical faces 4, terminating in depressed inner longitudinal horizontal ledges or shoulders 5. The horizontal top longitudinal edges of the portions 3, are parallel with and of the same lengths, usually as the shoulders 5, and are separated therefrom distances equal to the height of the vertical faces or walls 4. Strong heavy metal caps or plates 6, are rigidly and strongly fixed as by bolts 7, on the horizontal top edges of the portions 3, so as to project inwardly and horizontally beyond the same and above and parallel with the ledges or shoulders 5, and

be separated therefrom vertically. The four caps 6, are arranged longitudinally of the base and are horizontal and parallel with each other and are formed flat at their top and bottom faces to form tracks for the carriage supporting rollers and slideways for the longitudinal sliders or flanges of the carriage, as hereinafter set forth.

The cutter blade or disk feed carriage is arranged and movable longitudinally within the base and at its opposite end portions is supported therein or thereby, and at its central or intermediate portion is provided with the cutter disk and its carrying and driving drum, arranged between the reduced central top portions of the longitudinal side walls of the base. The main body of the carriage, in the specific example illustrated, is formed by a single casting having the horizontal longitudinal rear end 8, and the horizontal longitudinally elongated front end 9, having a depending end portion 10, carrying the thrust bearing 11, for the horizontal longitudinally arranged rotary feed screw 12, meshing with the feed nut 2, fixed in the upper part of the front end wall of the base, and whereby the feed carriage is reciprocated. The intermediate portion of the length of said main body of the carriage, is arranged longitudinally between the side walls of the base and its side faces are spaced from the inner faces of said base side walls, and forms and constitutes the lower section or saddle of the cutter blade drum and gear box or housing. In the specific example illustrated, the cap or upper section of said drum and gear box or housing is formed by a separate casting secured by suitable bolts, such as 13, to the saddle or main body or casting to form and constitute the complete journal box and gear housing as fully set forth hereinafter.

The longitudinal end portions 8, 9, of the carriage are arranged between the upper end portions 3, of the vertical side walls of the base, and at their opposite longitudinal side edges are formed with properly scraped or shaped longitudinal parallel horizontal sliders, flanges or edge rails 14, arranged beneath the caps 6, and above the shoulders 5, and having their longitudinal vertical outer edge walls 15, parallel with and opposed by the vertical walls 4 of the base. The longitudinal horizontal top faces of said sliders 14, are adapted to engage and slide along the overhanging bottom faces of the caps 6, and the horizontal bottom faces of said sliders 14, should be elevated a slight distance above the horizontal shoulders or ledges 5. The caps 6, through the medium of the sliders 14, maintain the carriage against upward movement from its desired horizontal path of reciprocation while the walls or faces 4, maintain the same against lateral deflection from said

path, and the shoulders or ledges 5, will uphold the carriage or limit the downward movement or adjustment thereof. In other words, the range of vertical adjustment of the carriage is limited to the distance, usually a slight fraction of an inch, between the ledges 5 and the bottom faces of the carriage sliders or flanges 14.

In the specific example illustrated, the carriage is supported or upheld by wheels or rollers 16, (four in the present instance) traveling longitudinally of the horizontal top faces of the overhanging portions of the caps 6, that is immediately above the sliders 14. These rollers 16, are arranged in pairs, and are mounted loosely on two horizontal axles 17, arranged transversely of and above the end portions of the carriage and projecting over the base caps 6 that form the trackways for the rollers. Each axle at its opposite ends is formed with end journals 18, to receive and form the bearing journals for the hubs or boxes of the rollers 16, and the axle is usually squared between the said end journals. The axle end journals 18, are elongated so as to project outwardly beyond the roller hubs to receive removable collars clamped on the journal ends to confine the rollers in proper position thereon. I show these collars formed with and carrying shields or housings for the truck wheels or rollers 16. Each housing is cast or otherwise formed as a hollow metal box or body 19, to inclose a truck wheel, and formed at its outer or front wall with a split collar 20, to receive the projecting end of the axle journal 18, and having a clamping screw whereby said collar can be rigidly clamped on the axle to fix the housing thereto inclosing the wheel and limiting outward movement of the wheel on the axle. The inner vertical wall of the housing is vertically slotted to slip down over the axle at the inner face of the wheel. The box is open at the bottom and said open bottom is surrounded by the horizontal bottom edge 21 of the housing moving above and in close proximity to the trackway on which the roller travels to sweep said trackway clear of chips or other obstructions over which the wheel might pass or which might tend to obstruct the passage of the wheel.

Suitable means are provided for hanging or supporting the feed carriage from the axles 17, and for vertically adjusting the carriage with respect to said axles and the truck wheels. For instance, I provide two chairs, supports or pillars for each axle and arranged, respectively, adjacent to the two wheels of the axle. The chairs for each axle are shown as comprising a web 22, extending horizontally and transversely of and above a carriage end, and at its ends formed with vertical pillars or heads 23, at their lower ends or edges formed to seat on the

top face of the carriage end adjacent to the flanges or sliders 14 thereof and also adjacent to the inner vertical longitudinal edges of the base caps 6. The web 22, is formed with a longitudinal top groove or channel 5 open at the top for the passage of the axle and this groove at its opposite ends opens through the heads 23, at 24. This groove is of sufficient vertical depth to receive the 10 axle and permit limited vertical movement of the axle within the groove or of the support or chair independently of the axle; and said groove is formed to prevent lateral play of the axle within the chair or support 15 therefor.

Strong caps 25, are arranged on the horizontal upper ends or edges of the heads 23, across the guide openings 24, therethrough and above the end portions of the axle. 20 These caps are secured to said heads, and the support or chair (consisting of the web and the two heads) is rigidly secured to the carriage, by vertical bolts 26, passed down through the ends of the caps 25 and 25 through the heads 23, and into the carriage.

The device as so far described would support the carriage from the axle by the caps 25 resting on the axle, but to provide for vertical adjustment of the carriage with respect to the two axles and four truck wheels, 30 I provide four heavy strong set screws 27, adjustable vertically through the caps 25 and at their lower ends bearing on the top faces of the end portions of the axles, 35 whereby the carriage is supported by the four set screws, each axle being engaged by two screws, and each screw is provided at its upper end with an exposed readily accessible head 28, and usually with a jam nut 40 29. By this arrangement, the vertical position of the carriage can be easily and quickly adjusted to a nicety by simply manipulating the four set screws 27, to even up the carriage and bring the sliders 14 thereof up 45 to the under faces of the base caps 6, with the desired degree of accuracy. Until the supporting axles and parts are applied, the carriage will rest on the base shoulders or ledges 5, and after the axles have been applied and the caps 25 properly secured, the 50 carriage is raised to the desired adjustment by the four set screws. Material advantages in operation and result are attained by thus mounting the carriage on truck rollers, generally about as described, as the feed screw 55 and transmission are thereby relieved of excessive strain, particularly in view of the fact that in a machine of this character, the feed carriage and parts carried thereby are 60 exceedingly heavy. Furthermore, great saving in expense of manufacture is attained by employing a carriage mounting generally about as described, inasmuch as a great deal of expensive machine work and planing for 65 accurate fitting at slide ways are avoided,

all as will be readily understood by those skilled in the art.

The metal cutting or severing element carried by and rotating in the carriage consists of a vertical flat circular hard steel (or 70 other suitable metal) blade or disk 30, having a central work receiving opening 31, and the portion of the disk around said central opening is formed with a circumferential series of equally spaced usually radial cutter 75 receiving pockets 32, all opening through the edge of the blade surrounding the work receiving opening, and adapted to detachably receive insertible or attachable cutters 80 33, wedged or locked in said pockets by driven keys or wedges 34, each cutter having a cutting or working point or edge 35, projecting about radially into the work receiving opening of the disk and composed of "high speed" or "high duty" steel, that 85 is, steel of such composition or so treated as to be capable of cutting hard metal such as steel at a very high rate of speed without fusing or losing in efficiency.

In the specific example illustrated, each 90 insertible cutter is complete within itself and at its inner end is provided with a longitudinally adjustable stop screw 36, to abut against the inner end wall of the pocket and maintain the working point or edge of the 95 cutter projecting the desired distance into the working opening of the disk. The cutters of the disk are set so as to all project the same distance into the working opening of the disk, or all converge toward a common 100 point, the center of the opening, and each cutter is firmly wedged and locked in its pocket by the wedge 34 driven in between the rear edge of the cutter and the corresponding edge wall of the pocket. 105 Whenever a cutter needs sharpening or is damaged, it can be easily removed by loosening its locking wedge or key, all as fully set forth in my copending application S. No. 512,337. This cutter disk or blade 30, is 110 carried and driven by and is secured to the front end edge of a horizontally disposed open or cylindrical rotary drum 37, arranged transversely of and within the feed carriage between the longitudinal or vertical 115 side walls of the base and at its end edges spaced from the inner vertical faces of said base side walls. The front vertical end edge 38, of this drum is arranged flat and in one plane to receive and fit against the inner face 120 of the disk 30, usually with the disk edge projecting radially beyond the drum surface. The edge 38, of the drum is provided with a circular series of spaced studs or pins 125 39, fixed to the drum and projecting longitudinally from said edge to removably fit in correspondingly arranged perforations or holes extending transversely through the disk 30, and said edge 38 of the drum is 130 formed with a circular series of tapped holes

or sockets to removably receive headed machine screws 40, removably passed transversely through the disk, with their heads countersunk therein, and by which the disk is removably and yet most rigidly secured to the edge of the drum. If so desired the circumferential edge of the disk can be beveled off about as shown. The disk which is usually composed of hard steel can thus be readily removed from or applied to the drum from the front side of the machine, and the central or working opening of the disk is concentric with the drum or with its axis of rotation, which axis of rotation of the drum and disk is transverse of the base and feed carriage and arranged about in the horizontal plane of the flanges or sliders of the carriage, and above the top edges of the depressed central portions of the vertical side walls of the base.

The interior surface 41, of the drum is shown tapering off or flaring from the front toward the rear open end of the drum to facilitate the discharge of the cooling fluid from the interior of the drum at its rear end into the tank or receptacle formed by the hollow base.

42, is the main driving gear through which the drum is rotated and this gear is operatively rigid with the drum and arranged exteriorly thereof and about midway between the ends thereof. The drum forms the gear hub, and although in the example shown, the gear is clamped on and keyed to the drum, yet the gear might be cast in one piece with the drum, or otherwise secured rigid therewith.

The opposite ends of the disk-carrying drum are mounted and supported in journal boxes 43, exteriorly surrounding the drum at opposite sides of the exterior drum driving gear 42, and between and rigid with these boxes 43 and connecting the same and carried thereby, is a gear box or casing 44, inclosing the gear 42. The lower halves of the drum journal boxes 43, and of the gear box 44, in the specific example illustrated, form a part of the main or body casting of the feed carriage and depend into the hollow base, while the upper halves of boxes 43 and 44 are formed in one casting constituting the cap placed on the main or body casting of the carriage and secured by the bolts 13, hereinbefore referred to. The top or cap casting is shown formed with oil chambers 45 on top of the two boxes 43 and on opposite sides of the top portion of the gear box 44 with side openings through the side walls of the gear box into said oil (or other fluid lubricant) chambers 45. Oil ducts 46 extend down from the bottoms of chambers 45 to the top portions of the bearing surfaces of the journal boxes 43 to lubricate the disk-carrying drum. If so desired, oil filtering material 47, can be ar-

ranged in the bottoms of the oil chambers 45 for filtering the oil before it is passed to the drum bearings. Near its opposite end portions, the exterior of the drum can be formed with annular oil grooves 48, and the outer end portions of the journal boxes with annular oil catching ducts or passages or grooves 49 to catch the oil escaping outwardly from the journal boxes and deliver the same into the oil supply receptacle formed by the lower portion of the gear case 44, through the oil ducts 50, from the lowest portions of oil catching channels 49 and opening through the opposite side walls of the gear case 44. The desirable quantity of lubricating oil will be maintained in the gear box 44, and the gear 42 revolving therein will elevate oil which dropping from the upper part thereof will be caught by the oil ducts or deflectors 51 and delivered laterally through the side openings into the oil chambers 45, whereby the disk-carrying drum will be constantly supplied at its bearings with an ample supply of lubricant, and the same body of oil is used over and over again.

If so desired, the front end of the drum can be exteriorly and circumferentially rabbeted, at 52, and the front journal provided with an exterior annular inwardly projecting flange or lip 53, forming a running joint with said rabbeted portion to prevent leakage of lubricating oil around the cutter disk. The rear end of the drum casing is also provided with an annular inwardly projecting flange 53', forming the rear wall of the rear annular oil chamber 49, and at its inner edge fitting the circumferential surface of the rear end portion of the drum and forming a running joint therewith to prevent escape of oil from rear chamber 49. The annular grooves 48, in the circumference of the drum are designed to collect and sling the oil in the chambers 49, and thus aid in preventing leakage thereof outwardly and longitudinally of the drum. The drum ends in connection with the drum casing ends are designed to prevent the soda water, or other liquid used to flood the cutters while at work, from passing into the bearings and oil passages within said casing. For instance, I show the exterior or projecting front and rear ends of the drum arranged to radially or centrifugally sling off or discharge said cooling liquid, and the side walls or ends of the top half or section of the drum casing overhang (see *a'*, Fig. 4) said exterior ends of the drum to catch the cooling liquid slung from said drum ends and thus confine said cooling liquid and cause the same to run down said overhangs and drop and discharge into the tank formed by the hollow base. In the particular example illustrated, the projecting exterior rear end of the drum is formed with one or more annular circumferential cooling liquid collect-

ing and slinging grooves 53^a, (Fig. 4), while the front projecting end of the drum is provided with cooling liquid collecting and slinging means, in this instance, formed by the annular radially projecting free edge 53^b, of the cutter disk 30.

Fresh supplies of oil can be introduced into the lubricating system thus described, through the open tops of the oil chambers 10 45, normally closed by the removable covers or lids 54.

The cap of the feed carriage comprising the upper half of the gear box 44 is formed to carry the pinion 54, driving gear 42, and the shaft, driving pulley and clutch therefor. The pinion 54, for driving and meshing with gear 42, is carried by elongated pinion shaft 55, and this pinion is shown arranged at the upper portion of the gear 42 20 about midway between the horizontal and vertical diameters of the gear 42. Usually the pinion 54 is located about at that point of the periphery of the gear 42, farthest removed from the point of application of the 25 disk cutters to the work.

The upper portion of the gear box or case 44, is cast or otherwise formed with a transverse open end housing 56, usually split and provided with a clamping bolt, to receive 30 and tightly hold bearing sleeves 57, 58, arranged at opposite ends of the pinion 54, respectively and receiving the portions of the shaft projecting in opposite directions from the pinion. The rear end of the bearing 35 sleeve 57, projects beyond the gear case housing 56, and forms a stud on which the driving pulley 59, is mounted to freely revolve. The driving pulley 59, is formed with an annular concentric rearwardly projecting clutch flange 60, containing an ex- 40 pansible split spring clutch ring or shoe 61, normally contracted from operative frictional engagement with said flange so that the pulley 59 normally runs as an idler. 45 The split spring clutch ring or shoe 61 is carried by and arranged to revolve with and drive a clutch disk or flange 62, keyed or otherwise fixed to the end of the pinion shaft projecting rearwardly beyond the bearing 50 sleeve stud 57. The normally contracted clutch ring is confined to the clutch disk 62, by any approved means, such as stud 63. The clutch disk 62, carries suitable means for expanding the split ring 61, into frictional driven engagement with the pulley 55 flange 60, for the purpose of locking the clutch disk 62, and the pinion shaft to the driving pulley 59 to be driven thereby. For instance, I show rock shaft 64, mounted to 60 rock in the clutch disk and having beveled headed end 65, arranged between the ends of the clutch ring 61, and arranged and formed so that when rocked from its normal position, it will engage said ring ends 65 and force the same in opposite directions

and away from each other and thereby expand the ring into locking position and against its spring tension. In the example 70 illustrated, the shaft 64, is rocked by and is provided with a depending or crank arm 66, fixed on the projecting outer end of the shaft and at its lower end provided with a roller yieldingly held in engagement with a longitudinally movable cone 67, forming a 75 cap covering the end of and slidable on the exterior of the projecting rear end of the pinion shaft 55, which rotates freely in the cone. Suitable means can be provided for yieldingly holding the arm 66, and its roller in operative relation with respect to the 80 cover 67. For instance, in the particular example illustrated, the spring tension of the clutch ring acting on the beveled head 65, yieldingly holds the shaft 64 in normal position, with the roller of arm 66 bearing 85 against said cone. Suitable means are provided for moving said cone longitudinally of the shaft to throw the shaft into and out of gear with its driving pulley 59, and consequently to throw the cutter disk drum into 90 and out of driving connection with its driving means. For instance, I show the pinion shaft 55, hollow throughout its length with a pull rod 69, extending therethrough and movable longitudinally therein and at its 95 rear end coupled to the rear portion of the cone 67, to move the cone longitudinally on the pinion shaft. At its projecting front end said pull rod is pivotally joined to a hand lever 70, arranged and accessible at 100 the front of the feed carriage above the cutter disk and suitably fulcrumed to arm 71.

In the example illustrated, I show the clutch disk 62, (keyed to the shaft 55), 105 formed with an oil box or drum 72, extending rearwardly therefrom and inclosing the portion of the shaft projecting rearwardly from said disk and the cone and other parts thereon and adapted to receive a suitable 110 quantity of oil for maintaining the lubrication of the clutch and operating parts and adjacent surfaces where it is possible for the oil from said box to work thereto. At its forward end and spaced from and surrounding 115 the clutch flange 60, of the drive pulley, I show said oil drum formed with an annular exterior oil throwing flange or lip 73 adapted to receive the oil escaping from the clutch and between the drive pulley 59 and 120 the clutch disk 62, and throw the same centrifugally into the narrow inlet slit or slot 74, of an oil catching ring 75 surrounding and spaced from said flange 73, and formed 125 hollow or U-shaped in cross section to catch the oil thus thrown and retain the same and deliver said oil into a receptacle 75', forming a part of said ring and into which the same opens. The receptacle is provided at its lower portion with a suitable normally 130

closed outlet through which the oil can be drawn off when desired. The oil catching ring and receptacle constitute a single element or device supported independently of the flange 73. The receptacle and ring are shown supported by and removably clamped on a stud 76, from a part of or carried by the feed carriage.

The bearing sleeves 57, 58, for the pinion shaft are provided with suitable oiling ducts 77, distributing the oil from suitable sources to the pinion shaft bearings, and the oil escaping from said bearings is delivered into oil pockets 78, formed in the bottom portions of the housing 56, and provided with means whereby the oil can be drawn therefrom.

The cap forming the upper portions of the drum journal boxes and the gear box for the drum driving gear, can be cast or otherwise provided with brackets 79, to which the motor supporting pan or base 80, is bolted where it is desired to mount the machine driving motor *a*, on the feed carriage.

Driving power for rotating the cutter disk is transmitted from the motor *a*, to the drive pulley 59, through any suitable medium, such for instance as the driving belt *b*. The feed carriage is also actuated, if so desired, on its feeding and return reciprocations, through the medium of said driving belt *b*, pulley 59, and the clutch mechanism hereinbefore described, so that the feed carriage will be stopped and started with the cutter disk, so that said clutch constitutes the main clutch of the machine. To accomplish this end, the oil drum and the clutch disk 62, constitute a pulley and said drum 72, is formed with an exterior driving belt receiving face 81 for actuating the feed carriage transmission through the medium of a belt *c*, or other suitable device.

Various means can be provided for varying the speed of the feeding stroke or movement of the feed carriage, although in the example illustrated I show series of cone pulleys and a belt drive. I show the belt *c*, from clutch pulley 81, to the drive pulley 82, of a transverse shaft 83, suitably mounted at the upper portion of the feed carriage and carrying series of cone pulleys 84, adapted to be connected by belt *d*, with the series of corresponding cone pulleys 85, to drive the same. The cone pulleys 85, are fixed on transverse shaft 86, mounted in a tight gear box 87, fixed on the front end 9, of the feed carriage. In this gear box is mounted the longitudinal feed shaft 88, projecting rearwardly from said box and at its rear extremity having hand wheel 89, fixed thereon and by which the feed carriage can be moved by hand when necessary and parts are in the proper positions or adjust-

ments. The feed shaft 88, is connected to rotate the feed screw 12, through the medium of suitable gearing, such as pinion 90, rigid with the rear portion of the feed shaft and the gear 91, rigid with the rear end of the feed screw. The rear end of the feed screw and the gearing 90, and 91, are inclosed in an oil tight case or box 92, fixed to and carried by the stationary thrust block 11, in which the feed screw rotates, and under which an oil catching pan 93 can be arranged to catch the drippings from the feed screw and block and deliver the same into the box or case 92, through the oil ducts 94 (Fig. 3). The shaft 86, actuates the feed carriage on its feed stroke by driving shaft 88 in the proper direction by means of screw gear 95, rigid on shaft 86, and screw gear 96, loose on shaft 88 and adapted to be coupled thereto to rotate therewith through the medium of suitable clutch 97, arranged on shaft 88 to constantly rotate therewith. The shaft 88, is rotated in the opposite direction to move the feed carriage on its quick return stroke by screw gear 98, normally loose on said shaft and adapted to be coupled thereto to rotate therewith by clutch 99, rotating with said shaft. The gear 98, is driven by screw gear 100, on shaft 101, mounted in gear box 87, and at the exterior thereof provided with pulley 102, driven by belt *e*, from the pulley 103, on the counter-shaft 83.

Suitable means are provided to operatively connect either screw gear 96, or 98, with the feed shaft 88, and at the same time operatively disconnect the other screw gear therefrom, or to operatively disconnect both said gears from said shaft should it be desired to feed the carriage by hand through the medium of hand wheel 89. As a means which might be employed for this purpose, I show double cone 104 loose on shaft 88, and movable longitudinally thereof and arranged between the two clutches 97, 99, and formed to actuate the clutch operating or applying devices of one clutch when shifted longitudinally in one direction, and to release said devices and operate the devices of the other clutch when thrown to its limit in the opposite direction, while when located midway its range of movement said cone permits both clutches to be disengaged or in inoperative position. Suitable means are provided for operating or throwing this cone, such as horizontally-swingable cone-throwing lever 105, fulcrumed in the gear box 87, and having an extended end at the exterior of said box movable between stops 106, and 107, carried by and adjustable longitudinally of a horizontal rod 108, arranged parallel with the direction of movement of the feed carriage and carried by a rigid arm or bracket fixed to the base (Fig.

1). By this arrangement the clutches are automatically controlled to change the direction of movement of the feed carriage as will be well understood by those skilled in the art. The lever 105 can also be operated by hand when desired to shift the clutches.

Suitable means are provided for receiving and holding the steel bars or other stock or work to be severed by the cutters of the cutter disk, and for receiving and holding the section or length cut from the bar or stock. For instance, I show a heavy metal saddle 109, resting on the top edge of the central part of the depressed top of the front side wall of the base and opposite the working opening in the cutter disk, and formed with a central transverse V-shaped depression 110, to receive the stock and forming the bottom or stationary jaw of a stock clamping vise. This saddle has a portion depending at the vertical outer face of said front wall of the base to receive the stock trolley rails, as hereinafter set forth. This saddle is secured to the base by a pair of vertical upwardly extending bolts 111, passing through the opposite ends of the top portion of the saddle, and the upper ends of these bolts are connected by a strong heavy cross head 112. 113, is the vertically movable or upper jaw of the stock vise or clamp vertically movable on and guided by the bolts 111, which pass loosely through the ends of said movable jaw. 114, is the vertical screw by which the movable jaw is raised and lowered and through which it is forced down to rigidly and securely clamp and hold the stock or other work in the V-shaped depression of the lower or fixed jaw and in proper position to be operated on by the cutters of the cutter disk. The screw 114, passes through a threaded opening in the cross head which acts as a fixed nut for the screw, suitable means being provided whereby the screw can be rotated to move the sliding jaw. The fixed jaw of the vise terminates closely adjacent to the front face of the cutter disk and is so arranged that the stock resting in said jaw can pass through the working opening of said disk and extend the desired distance through and beyond the disk so that when the cutters have severed the stock, the required length of stock will be cut off and remain in rear of said disk. In order to receive and hold the length of stock projecting through and beyond the cutter disk and maintain the same after being severed, I provide an elongated strong rigid V-shaped trough 115, arranged transversely of the base and carriage and extending longitudinally into the drum and at its front edge terminating in rear of and closely adjacent to the rear face of the cutter disk

and alined with the V-shaped depression of the fixed jaw of the vise, while the rear end of said trough extends rearwardly a distance beyond the rear side wall of the base. This trough rests on and is supported by and rigidly bolted to the rear side wall of the base and traverses the top edge thereof. Within the drum said trough is formed with a cooling liquid discharge slot or opening 117, through the bottom thereof and the bottom of the trough can be longitudinally inclined to said opening so that all of the cooling liquid that enters the trough will be discharged into the drum and from the drum into the hollow base. I show the front end of this stock holder or trough provided with a shield or hood 116, rigidly secured thereto and adapted to extend over the stock closely adjacent to the working plane of the cutters while severing the stock.

In view of the considerable length and heavy weight of the stock sometimes required to be operated on by machines of this character, I have produced a trolley device or rolling carriage, and track therefor, for supporting the stock and by which the stock can be more readily manipulated and fed to the cutters than heretofore. In the example illustrated I show a track extending from the machine in line with the trough 115, and comprising a pair of horizontal parallel spaced tracks, beams or channel irons 118, secured together and at their outer portions fixed to and upheld by one or more standards 119, and at their rear ends fitted to the front side wall of the base and secured by bolts, or otherwise to the depending portion of the saddle 109, see Fig. 4. A stock truck or trolley 120, is supported on said track through the medium of wheels 121, and is movable longitudinally thereof by a gear wheel 122, carried by the truck and operated by a hand wheel 123, and meshing with rack 124, arranged longitudinally of and fixed to the track. This truck is formed with a top V-shaped depression to receive the stock and with a clamping screw 125, whereby the stock can be wedged and clamped into said depression to act in conjunction with the machine vise, hereinbefore described in holding the stock during the severing operation, if so desired, but more particularly to hold the stock to the truck during the operation of moving the truck forward by the hand wheel when feeding the desired length of stock across the vise jaw 110, and through the working opening of the cutter disk.

I provide a gage for limiting the forward stock moving movement of the stock carrying trolley to a distance equal to the length of stock to be cut off plus the width of the slot cut by the cutters. For instance, I show a block 126, extending over one of the track rails with a hooked end engaging the inner face thereof while the opposite portion of

the block depends at the outer face of the rail and projects under the top flange thereof so that the block can be moved longitudinally along the rail, and can be clamped thereto in the desired position by a clamping screw 127 carried by and adjustable through the block to drive a clamping pin 128 against the rail. The upper portion of this slidable block at a point between the two rails, is formed with an open top slot 129 extending in a direction parallel with the lengths of the rails. The trolley is provided with a rearwardly extending lug 130, formed with an open top T-slot. If the stock resting on the trolley and the fixed jaw of the vise with its rear end at the cutter disk opening, is to be moved through said opening a certain distance so that the cutters will sever just the length of stock required; the block 126 is moved along the rail until it engages the rear end of the trolley, a double head bolt or link 131, of the length of bar to be fed forward plus the width of the slot cut by the cutters, is then dropped into the slots in the lug 130 and the block, and the block is clamped rigidly to the rail. The truck is then moved forward and when it has moved the required distance the heads of the link or bolt 131 engaging the trolley lug and the block, will limit further forward movement of the trolley. When the required length has been cut from the stock, the operation is again repeated, by moving the block up to the rear end of the trolley and again clamping the same. Those skilled in the art will readily understand the convenience of such a device in handling stock in metal cutting off machines.

At the front end of the track, I provide a stock supporting idler and grooved pulley or roller 139 arranged transversely above the rails and supported by a saddle 140 resting on and clamped to the rails. This roller is mounted and rotates on an eccentric portion of a shaft 141, rotatively mounted in the ends of the saddle and provided with an end hand lever 142 by which the shaft can be rocked or rotated to raise and lower the roller through the medium of the eccentric portion of the shaft within the roller. When the stock is to be moved forward across the fixed vise jaw, the shaft is turned to raise the roller and thereby lift the stock above the vise jaw so that the stock can be freely moved forward, and when the stock has been moved the required distance, the eccentric shaft is turned back thereby lowering the roller and dropping the stock onto the vise to be clamped for cutting. The operation of moving the stock is greatly facilitated by this arrangement.

The tank formed by the hollow base is adapted to receive any suitable cooling liquid for flooding the stock and cutters during the cutting operation, and hence I show a

pump 143, mounted on any suitable portion of the feed carriage and operated in any suitable manner as by belt *f*, from shaft 83, and provided with a suction pipe 144, extending to the lower portion of the interior of the base, and a fluid discharge pipe 145, extending into the cutter disk drum through the rear open end thereof and having a discharge to flood the cutters while at work. The fluid flows from the drum as hereinbefore described back into the tank formed by the base, so that the liquid is kept traveling by the pump in endless circuit and the same liquid can be used over and over without waste, if so desired.

In this connection, I provide means whereby the chips can be strained or filtered from the cooling liquid before it is again discharged into the interior of the base. For instance, in the example illustrated, I show transverse openings through the side walls of the base above the bottom thereof and below the opposite ends of the drum. In these openings, I secure open top pans 146 projecting to the exterior of the base and within the base having open bottoms covered by screens 147, so that the liquid dropping from the cutter disk and from the drum will fall into these pans and will pass down through the screens into settling chambers 148, and overflow therefrom back into the base. The screens will separate the chips from the liquid, and the chips can be raked or otherwise removed through the outer ends of the pans. Receptacles 146', can be provided at the exterior of the base and below the outer ends of the pans 146, to receive the chips raked or otherwise drawn outwardly from said pans. The soda water, or other cooling liquid with which the cutters and work are flooded while in action, flows down at the inner and outer faces of the cutter blade, and a portion of said liquid is discharged from the liquid slinging edge 53^b, of said blade, while the remainder of said liquid is caught in the drum and flows rearwardly therein and discharges from the rear open end thereof. The front and rear ends of the drum are located in the open top of the base so that said liquid drops into the base. The pans 146, project into the base directly below and the front and rear ends of the drum to catch the chips and to separate the liquid therefrom. These pans constitute filters to separate chips from said liquid on its passage back into the bottom of the tank where it is accessible to the suction pipe 144 (Fig. 3). The liquid overflows from settling chambers 148 through passages 148' into the bottom of the tank formed by the base.

The machine of this invention has been particularly designed for constant hard service and exceedingly rapid work, and to drive the cutters at both feeds and speeds not

possible with machines now on the market. In other words, to drive the cutters at their full capacity as to speed and consequent temperature, without injury to the machine and without chattering or injurious vibration. The machine can sever comparatively small bars and stock but is particularly intended for severing heavy steel bars, say of six inches diameter or more, at an exceedingly rapid rate of speed, and to keep in constant use month in and month out. The construction and arrangements of parts are such that adjustments and repairs can be easily and quickly made.

It is evident that various changes, modifications and variations might be resorted to, that elements might be omitted, and structures might be added without departing from the spirit and scope of the appended claims, and hence I do not wish to limit myself to the exact disclosure hereof.

What I claim is:—

1. In a cutting-off machine, in combination, a feed carriage comprising an annular box forming an oil well and having contracted opposite side openings, a hollow rotary drum extending through said box and occupying said openings, and provided with an exterior drive gear inclosed in said box, and rotating through said oil well, a driving pinion for said gear, and a cutter disk spanning said drum and fixed thereto and provided with a central work receiving opening.

2. In combination, in a cutting-off machine, a base having vertically disposed side walls, a feed carriage provided with feed mechanism, and supported by and arranged between said side walls, a rotary hollow drum arranged transversely of said carriage and provided with and spanned by a cutting disk having a central work receiving opening, said drum provided with an exterior driving gear, said carriage forming an annular box inclosing said gear and supporting and providing bearings for said drum at the opposite faces of said gear, gear-driving means carried by said box, and a work clamp arranged in front of said disk.

3. In a cutting-off machine, in combination, a base, a feed carriage supported thereby and composed of a vertically disposed annular box having contracted central openings, a horizontal hollow rotary drum extending centrally through and rotating in and carried by said box and provided with an exterior driving gear arranged on the drum intermediate its ends and inclosed by said box, and a cutter disk having a central work receiving opening, said disk spanning and fixed to said drum, said box providing bearings for said drum at opposite sides of said gear, the end walls of said box fitting around the circumferential end portions of said drum.

4. In a cutting off machine, in combina-

tion, a base, a feed carriage, actuating means therefor, a hollow rotary drum mounted in said carriage and having an exterior concentric driving gear rigid therewith, a driving pinion for said gear, actuating means for said pinion, and a cutter disk spanning said drum and removably secured around its outer edge portion against said drum, and having a central transverse work receiving opening, and provided with cutters arranged around said opening and projecting thereinto, said carriage comprising a casing inclosing said gear and pinion and providing bearings for said drum at opposite sides of said gear.

5. In a cutting off machine, in combination, a base having vertically disposed side walls, a feed carriage supported by said base and extending down between said side walls, feed mechanism for said carriage, a rotary hollow drum arranged transversely of and extending through said carriage, a saw blade secured to and spanning said drum and provided with a central work-receiving opening and cutters, and means for rotating said drum comprising a gear rigid with said drum and a driving pinion therefor, said carriage forming a casing inclosing said gear and providing bearings for said drum at the opposite sides of said gear.

6. In a metal cutting off machine, in combination, a base having spaced vertical side walls, a feed carriage carried by said base, feed mechanism for said carriage, a rotary hollow drum arranged transversely of and carried by said carriage, a saw blade secured to and spanning said drum and having a central work-receiving opening and cutters, and means for rotating said drum comprising a pinion and a gear fixed to and arranged at the exterior of said drum and driven by said pinion, said carriage comprising a carriage-supporting saddle arranged between said base walls and having means slidably engaging the same and a cap mounted on said saddle, said cap and saddle providing bearings for both ends of the drum, and being hollow and inclosing said drum and its gear.

7. In a cutting-off machine, in combination, a base, a feed carriage provided with actuating means, and a rotary cutter disk carried thereby and provided with exterior driving means and having a free circumferential liquid slinging edge, said disk provided with a central work receiving opening and a series of cutters arranged around and projecting into said opening.

8. In a cutting off machine, in combination, a base, a feed carriage mounted thereon and provided with actuating means, a hollow rotary drum mounted to rotate in and arranged transversely of and extending through said carriage and having a rear open end, means exteriorly applied to said

drum for rotating the same in said carriage, a cutter disk spanning the front end of said drum and secured thereto around its circumferential portion and having a central transverse work receiving opening and cutters arranged around and projecting into said opening, and stock receiving and holding devices relatively fixed with respect to said drum and arranged closely adjacent to the front and rear faces of said disk.

9. In a cutting off machine, in combination, a base, a carriage, a hollow open-end drum mounted to rotate in said carriage and arranged therein transversely thereof and provided with an enlarged exterior concentric driving gear, driving means for said gear and carried by said carriage, said carriage inclosing said drum, gear and driving means and providing bearings for said means and for said drum at opposite sides of said gear, and a cutter disk spanning said drum and around its circumferential portion secured thereto and formed with a central transverse work receiving opening and provided with cutters projecting into said opening.

10. In combination, in a cutting off machine, a base, a feed carriage, a cutter disk drum carried by and mounted to rotate in said carriage and provided with a cutter disk secured thereto around its outer circumferential portion and having a central work receiving opening and cutters projecting thereinto, means applied exteriorly to said drum for rotating the same, a stock carrier arranged in the rear open end of said drum, and a stock vise arranged in front of said drum and disk.

11. A cutting off machine provided with a rotary cutter-disk drum provided with a cutter disk having a central work receiving opening and cutters, said drum being hollow and having an open end in rear of said disk, the inner surface of the drum flaring toward said open end for discharge of cooling liquid therefrom, in combination with a feed carriage in which said drum is mounted, and a base for said carriage providing an open top tank below said drum and receiving the liquid therefrom.

12. A cutting off machine having a rotary cutter-disk drum having a cutter disk spanning and around its edge portion secured to said drum and having a central work receiving opening and cutters, said drum having an exterior concentric driving gear in combination with a feed carriage, and driving means for said gear comprising a pinion in mesh therewith and its shaft, said carriage comprising a rigid casing inclosing said drum, gear and pinion and providing bearings for said shaft and for said drum at opposite faces of said gear.

13. A cutting off machine having a feed carriage, in combination with a hollow

rotary cutter-disk drum arranged transversely of and extending through the carriage and mounted to rotate therein and provided with a cutter disk around the outer edge portion of its inner face fitted removably and secured flat against the front end edge of said drum and having a central work receiving opening with cutters around the same said carriage comprising a rigid annular hollow casing surrounding said drum and exteriorly fitting the opposite circumferential portions thereof and providing opposite supporting bearings for said drum.

14. A cutting off machine having a large rotary gear wheel provided with a concentric center cutter disk having a central work receiving opening and cutters around and projecting thereinto, and a driving pinion for said gear, said pinion provided with a drive shaft, in combination with an annular rigid hollow casing circumferentially fitting the opposite ends of said drum and inclosing and supporting the drum, gear, pinion and its shaft, and providing bearings for said shaft and for the drum at opposite sides of said gear, whereby the radial loads of the shaft and drum are sustained by and distributed throughout the casing.

15. In combination, front and rear supports, a carriage, a rotary drum mounted in and transversely of said carriage, means for rotating said drum, a cutter disk carried by said drum and having a central work receiving opening and cutters around and projecting thereinto, a stock vise mounted on said front support in front of said disk, and stock receiving means fixed on said rear support and projecting into the rear of said drum.

16. In combination, a base, a feed carriage mounted thereon, a rotary cutter disk having a central work receiving opening and cutters around and projecting into said opening, means mounted in said carriage for supporting and rotating said disk, a stock vise carried by said base and arranged in front of said disk, and a fixed stock receiving trough in rear of said disk.

17. A cutting off machine having a rotary cutter-disk drum provided with a cutter disk having a central work receiving opening and cutters around and projecting into said opening, and a fixed stock support arranged in rear of said drum and extending longitudinally thereinto in rear of said disk.

18. A cutting off machine having a rotary cutter disk drum provided with a cutter disk spanning the same and having a central work receiving opening with cutters projecting thereinto, and a fixed stock holder and shield projecting into said drum in rear of said disk.

19. A cutting off machine having a rotary cutter disk and means for supporting and rotating the same, a base, a work-receiving

- trough fixed to the base and arranged behind the path of movement of the cutter disk, and means for clamping the work.
20. A cutting off machine comprising a base, a feed carriage, a rotary cutter disk and supporting and rotating means therefor mounted on said carriage, and a stock receiving trough carried by said base and arranged parallel with the axis of rotation of said disk to hold the severed section out from the work.
21. A cutting off machine comprising a base having side walls, a feed carriage movable between said side walls, a rotary cutter disk and means for supporting and driving the same mounted in said carriage, a saddle fixed on the top of one of said base side walls opposite said disk, and a stock holding vise carried by and rising from said saddle beside said disk.
22. A cutting off machine comprising a hollow base forming a liquid tank, a feed carriage carried thereby and movable therein over said tank, a cutter disk, means for supporting and driving said disk, said means being mounted in said carriage and constantly arranged directly over said tank to discharge cutter disk lubricating and cooling liquid therein, and means carried by and moving with said carriage for forcing liquid from said tank and to said cutter disk.
23. A cutting off machine comprising a hollow open top base forming a liquid tank, a feed carriage mounted on said base and movable in the open top thereof, a rotary cutter disk drum arranged transversely of and mounted in said carriage with its ends above the open top of the tank, and a cutter disk carried by said drum, whereby the refuse and liquid from said cutter and drum drop directly into said base throughout the full range of movement of the carriage in the base.
24. In a cutting off machine, in combination, a tank-forming base, and a feed carriage provided with cutting off devices and arranged between the vertical planes of the walls of the base and over the tank formed thereby.
25. A cutting off machine having a hollow receptacle forming base, a feed carriage carried by the vertical side walls of the base and movable in said base between said walls and provided with the cutting off devices arranged directly over the receptacle formed by the base to drop liquid and chips therefrom directly into said receptacle, said base being provided with means to catch the chips and separate them from the liquid.
26. A cutting off machine having a hollow receptacle forming base, a feed carriage mounted therein and provided with the cutting off devices directly over said receptacle and also provided with and carrying a pump to draw liquid from the base for cooling and lubricating the cutting off devices and stock being operated on.
27. A cutting off machine having a hollow open-end horizontal cutter disk drum provided with a cutter disk secured thereto and spanning the same and provided with a free circumferential liquid slinging edge, said drum being internally formed to discharge cutter lubricating and cooling liquid from the rear open end of the drum, and a base providing a receptacle below said drum and disk to catch the liquid therefrom.
28. A cutting off machine having a hollow rotary horizontal cutter-disk drum provided with the cutter disk, and a horizontal stock receiving stationary trough extending longitudinally into said drum and formed to discharge cooling and lubricating liquid from its lower portion within the drum.
29. In combination, in a cutting-off machine, a base having side walls provided with elevated feed-carriage-supporting portions, a feed carriage composed of a vertically disposed annular box having a transverse approximately central opening therethrough and provided with supports laterally remote from said opening to cooperate with said supporting portions of said base side walls in upholding said carriage on its feed and return strokes, a hollow rotary drum extending through said opening and carried by said box and provided with an exterior driving gear within said box, and a central-opening cutter disk spanning said drum and fixed thereto.
30. A cutting off machine having a feed carriage formed with a pair of journal boxes for the cutter disk rotary drum and with a closed gear box joining said journal boxes for the drum driving gear and forming an oil supply receptacle in combination with a base, means for feeding said carriage, a hollow drum arranged centrally of said gear box and at its ends mounted in said journal boxes and intermediate its ends provided with an exterior driving gear, a driving pinion for said gear and arranged in and inclosed by said gear box, and a cutter disk carried and driven by and spanning said drum.
31. A cutting off machine having a feed carriage provided with a horizontal transversely arranged rotary cutter disk drum having an exterior driving gear, journal boxes for the opposite ends of said drum provided with a gear box for and inclosing said gear, and a pinion for driving said gear and inclosed by said gear box.
32. A cutting off machine having a horizontal rotary drum, a journal box therefor provided with a top oil chamber opening into to supply oil to said box and with an oil discharge passage from said box, said machine having an oil receptacle receiving the oil from said discharge passage, and

means to elevate oil from said receptacle and deliver the same into said chamber.

33. A cutting off machine having a horizontal rotary drum provided with an exterior driving gear arranged intermediate the ends of the drum, journal boxes for the opposite ends of said drum and a gear box for said gear and between and connecting said boxes and forming an oil receptacle through which said gear revolves, said boxes having oil chambers discharging to the drum bearings and oil discharge passages therefrom to the interior of said gear box, said chambers having oil inlet openings to receive oil elevated by said gear.

34. In combination, in a cutting-off machine, a hollow base forming a liquid receptacle and provided with an open top chip pan formed to permit the liquid to drain therefrom into said receptacle, a feed carriage carried by said base, a horizontally disposed hollow rotary drum mounted in said carriage to drop liquid and chips into said pan, a cutter disk fixed to and driven by said drum, and actuating mechanism.

35. In a cutting off machine, in combination, a casing provided with a housing, a rotary hollow drum carried by and rotatable in said casing and provided with a cutting off saw, said drum having an exterior driving gear rigid therewith and inclosed by said casing, a bearing sleeve fixed in said housing, a pinion shaft mounted in said sleeve and provided with a pinion withpin said casing for driving said gear, a drive wheel at the exterior of said casing and loosely mounted on said sleeve, a clutch between said wheel and said pinion shaft, and clutch controlling means.

36. In a cutting off machine, in combination, a base, a feed carriage carried thereby, transmission mechanism for actuating said carriage on its feed and quick return strokes comprising speed changing means, a rotary member carried by said carriage and provided with a rotary cutting off saw, a pinion shaft mounted in said carriage, meshing gears from said shaft to said rotary member for driving the same, a wheel fixed on said pinion shaft for driving the same, operative connections other than said meshing gears from said wheel to said transmission mechanism for driving said mechanism from said wheel, a main drive wheel, a support therefor other than said shaft, and a manually controlled clutch mechanism between said wheels.

37. In a cutting-off machine, in combination, a base, a feed carriage carried thereby and comprising a vertically disposed annular box forming an oil receptacle, a horizontally-disposed hollow rotary drum arranged and rotatable in said box and extending therethrough and provided with an exterior driving gear inclosed by said box and travel-

ing through said oil receptacle, operating means meshing with said gear, and a cutter disk fixed to and spanning said drum, said box providing bearings for said drum on opposite sides of said gear.

38. In combination, in a cutting-off machine, a base, a feed carriage carried thereby and composed of a vertically disposed annular box, a horizontal hollow rotary drum mounted in and extending through said box, and at its opposite ends projecting beyond the end walls of the box, said drum provided with an exterior driving gear inclosed by said box, said box providing bearings for said drum at opposite sides of said gear, the end walls of said box provided with inwardly extending flanges fitting around the circumference of the drum outside of said bearings, a cutter disk secured to and spanning said drum, and actuating means.

39. In a cutting off machine, in combination, a base, a hollow rotary drum intermediate its ends provided with an exterior driving gear, a pinion for driving said gear, actuating means for said pinion, a saw blade spanning said drum and secured thereto and having a central work receiving opening and cutters, and a case supported by said base and carrying said drum and circumferentially inclosing the same and said gear and providing bearings for said drum at opposite sides of said gear, means being provided circumferentially around the ends of said drum to exclude cutter cooling liquid from said bearings.

40. In combination, in a cutting off machine, a base having end and side walls, a feed carriage carried by said base and movable between its side walls, screw feed-mechanism between said carriage and an end wall of said base, transmission gearing for actuating said mechanism, a rotary center-opening saw mounted in said carriage, actuating gearing therefor, the axis of rotation of said saw being transverse to the direction of feed of said carriage and arranged approximately centrally of the carriage, and work holders arranged at said side walls and opposite said saw.

41. In combination, a base having parallel depressed ledges and caps above and spaced from and parallel with said ledges, a reciprocatory carriage having parallel flanges arranged between and parallel with said caps and ledges and normally elevated above said ledges, carriage supporting wheels traveling on the upper surfaces of said caps, axles for said wheels traversing and arranged above portions of said carriage, and means adjustably supporting said carriage from said axles.

42. In combination, a base having elevated parallel longitudinal trackways, a feed carriage movable longitudinally of said base and arranged between said track-

- ways, feed mechanism for actuating said carriage on its feed and return strokes, cutting means carried by said carriage, axles arranged transversely of said carriage and provided with carriage supporting wheels movable on said trackways, said carriage being vertically adjustable with respect to said axles, and means hanging and supporting said carriage from said axles.
43. In combination, a base having longitudinal opposite parallel side walls at the end portions thereof having overhanging longitudinal caps forming parallel trackways, a reciprocatory feed carriage arranged between said side walls and having longitudinal opposite edge flanges movable longitudinally beneath said caps and limited against upward movement thereby, said base having portions holding said carriage against lateral movement and ledges limiting downward movement of said carriage, and transverse axles arranged above the opposite end portions of said carriage and provided with carriage supporting wheels traveling on said caps, said carriage provided with means supporting the same from said axles and whereby the same can be vertically adjusted with respect to said axles and wheels.
44. A feed carriage, in a cutting off machine, having supporting wheels, a stationary axle therefor, and inclosing stationary shields for said wheels secured on the outer ends of the axle and open at the lower ends and having horizontal bottom track sweeping edges.
45. A base having opposite side walls provided with pairs of opposite parallel horizontal trackways, in combination with a reciprocatory feed carriage, axle chairs secured on and arranged transversely of said carriage, axles arranged longitudinally of said chairs and having carriage supporting wheels movable on said trackways, said carriage having a limited vertical movement independent of said axles, cross heads fixed on said chairs above said axles, and set screws depending and adjustable through said cross heads and engaging said axles and upholding the carriage thereon.
46. A cutting off machine comprising a base, a rotary cutting off saw, a stationary lower jaw arranged in front of said saw, a movable upper jaw to clamp the work on the lower jaw and in position to be operated on by said saw, a support in advance of said lower jaw, a work supporting and elevating idler roll carried by said support and mounted to rotate on a horizontal axis, said roll being normally dropped from operative engagement with the work resting on said lower jaw, and means for elevating said roll (when said upper jaw is elevated) into operative lifting engagement with the work to elevate the work from said lower jaw so that the work can be moved on said roll toward the saw and above said lower jaw, and whereby said roll can be dropped to normal position to deposit the work on said lower jaw for clamping.
47. A cutting off machine comprising a base, a rotary cutting off saw, a jaw arranged in front of said saw, means to clamp the work down on said jaw and in position to be operated on by said saw, a support in advance of said jaw, a work supporting and elevating idler roll carried by said support and mounted to rotate on a horizontal axis, said roll being normally dropped from operative engagement with the work while resting on said jaw, and an eccentric shaft for said roll provided with manually controlled means for rotating said shaft for elevating said roll to lift the work from said jaw so that the work can be moved on said roll toward the saw and above said jaw, and whereby said roll can be dropped to normal position to deposit the work on said jaw for clamping.
48. In combination, a base, means to operate on the work, a vise carried by said base to clamp the work in position to be operated on by said means, a track leading to said base, a trolley movable on said track and having a seat aligned with said vise so that the work can rest on said seat and in said vise and the trolley can be propelled to carry the work forward through said vise when the work is lifted therefrom, a saddle fixed on the inner end of the track and between the vise and trolley, and a work supporting- and -elevating idler roll mounted on said saddle and provided with manually controlled means whereby said roll can be moved vertically with respect to said saddle to lift the work in said vise so that the work will be supported by the roll and trolley for feeding forward through the vise, and to drop to normal depressed position from the work so that the work will be supported by the vise and trolley.
49. A cutting off machine comprising a base provided with a work clamp comprising a lower jaw, a cutting off saw arranged in rear of said jaw, in combination with a track leading to said jaw and provided with a longitudinal rack, a work trolley movable on said track and provided with work clamping means, adjustable stop devices for cooperating with said trolley to gage each feeding stroke of the trolley, and hand operated gearing carried by the trolley for propelling the same along said track by engagement with said rack.
50. A cutting off machine provided with a track leading thereto, a stock trolley movable on said track, an adjustable gage arranged on said track for limiting the stock

moving movement of said trolley and detachable stop connection between the trolley and gage, substantially as described.

51. In combination, in a cutting-off machine, a base, a feed carriage carried thereby and comprising a vertically disposed annular box forming a bottom oil receptacle, a horizontal rotary drum having an exterior projecting annular member inclosed by said box and traveling through said receptacle, said box providing bearings for said drum adapted to discharge lubricant into said receptacle, said box having oil catching portions arranged to catch oil carried up by said member and deliver the same to said bearings, and operating means.

52. In combination, in a cutting-off machine, a base, a feed carriage carried thereby and comprising a vertically disposed annular box forming a bottom oil receptacle, a horizontal rotary drum extending through and rotating in said box and provided with an exterior driving gear inclosed by said box and traveling through said receptacle, said box providing bearings for said drum at opposite sides of said gear and forming annular oil chambers circumferentially around the end portions of said drum between said bearings and the end extremities of said drum, the lower portions of said chambers discharging into said receptacle, means to deliver oil carried up by said gear to said bearings, and operating means.

53. In combination, in a cutting-off machine, a base, a feed carriage carried thereby and comprising a vertically disposed annular box, a horizontal rotary drum extending through and mounted in said box, said drum provided with a driving gear inclosed by said box, said box providing bearings for said drum, said box formed at its upper portion with oil channels leading to said bearings and means to catch oil dropping from the upper portion of said gear and to deliver the same to said channels, the lower portion of said annular box forming an oil receptacle through which the lower portion of said gear travels and said box being formed with passages to convey the oil from the bearings into said receptacle, and operating means.

54. In a cutting-off machine, in combination, a base providing a liquid receptacle and provided with chip boxes having liquid discharge passages into said receptacle, said boxes extending to and accessible from the exterior of the base, a horizontally disposed hollow rotary drum provided with and driving a cutter disk, said drum and disk being arranged over said boxes to discharge liquid and chips thereinto, a mounting for said drum, and operating means therefor.

55. In a cutting-off machine, in combination, a base having front and rear vertical side walls, a feed carriage, a horizontal hol-

low rotary drum mounted in said carriage and arranged between said side walls and provided with driving means, a center-opening cutter disk spanning said drum and fixed thereto, a work clamp fixed on the front side wall of said base in front of said cutter, and a work holding trough aligned with said clamp and fixed to the rear side wall of said base and extending into said drum at the rear face of said gear.

56. In a cutting-off machine, in combination, a base having front and rear vertical side walls, a feed carriage, a horizontal hollow rotary drum mounted in said carriage and arranged between said side walls and provided with driving means, a center-opening cutter disk spanning said drum and fixed thereto, work holding means arranged transversely on the front side wall of the base in front of said disk, and means to receive and hold the severed portions of the work in said drum and behind said disk, said last mentioned means being fixed to and arranged transversely of the rear side wall of said base.

57. In combination, in a cutting-off machine, a base, a vertically disposed annular gear box carried thereby and having a central opening therethrough, a rotary horizontal drum extending through said box and mounted in said opening, said drum provided with an exterior driving gear inclosed by said box, said box providing bearings for said drum, a bushing extending transversely through said box beyond the periphery of said gear and fixed in and supported by the box and at one end projecting beyond the same and providing bearings for a pinion shaft, a pinion shaft mounted in said bushing and provided with a pinion for driving said gear, a main drive wheel carried by and loosely mounted on the projecting end of said bushing, and a manually controlled clutch device for throwing said pinion shaft into and out of gear with said main drive wheel.

58. In a cutting-off machine, in combination, a base, a vertically disposed gear box carried thereby, a rotary drum mounted in and extending through said box, a driving gear rigid with and arranged exteriorly of said drum and inclosed by said box, a pinion shaft mounted in said box and provided with a pinion for driving said gear, a main drive wheel carried by and arranged exteriorly of said box, a clutch arranged exteriorly of and carried by said box to throw said pinion shaft into and out of gear with said main drive wheel, and clutch operating means comprising a hand lever arranged at the exterior of said box and operating connections therefrom extending loosely through said pinion shaft.

59. A cutting-off machine, in combination, a base, a feed carriage mounted there-

on, feed mechanism for actuating said carriage, a rotary drum mounted in said carriage and provided with a cutting disk and also with an exterior driving gear, a driving pinion for said gear, a pinion shaft mounted in said carriage and having an extended end, a wheel fixed on said end and operatively connected with said feed mechanism to actuate the same, a main drive wheel mounted concentrically with respect to said pinion shaft, and a manually operated clutch mechanism between and carried by said main drive wheel and said wheel fixed on said pinion shaft and adapted to throw said main drive wheel into and out of gear with said wheel fixed on said pinion shaft.

60. In combination, in a cutting-off machine, a base, a vertically disposed annular gear box carried by the base, a hollow drum mounted in and extending transversely through said box and provided with a cutter disk and also provided with an exterior driving gear inclosed by said box, a bushing fixed in the edge portion of said box adjacent the periphery of said gear, a gear driving pinion arranged in said box and provided with an axis mounted in said bushing, and pinion driving means extending from the exterior of said box concentrically into said bushing.

61. In combination, in a cutting-off machine, a base, a vertically disposed annular gear box, a drum mounted to rotate therein and extending therethrough and provided with a cutter disk and also provided with an exterior driving gear arranged within said box, a pinion shaft mounted in the edge portion of said box and extending from the exterior thereof, a pinion arranged within the box and driven by said shaft and driving said gear, said box provided with a hollow projection rigid therewith and surrounding said shaft, a driving wheel rotating freely on said projection, and means for operatively connecting and disconnecting said shaft to and from said wheel.

62. In combination, a base, a feed carriage provided with a supporting axle having projecting ends, wheels mounted on said axle and traveling on the base to carry the carriage and hoods arranged over said wheels and at their outer sides having split hubs clamped on the projecting ends of the axle and confining the wheels on the axle.

63. In a cutting-off machine, in combination, a base having parallel trackways, a feed carriage, said carriage and base having cooperating means to guide the carriage and limit its vertical and lateral play, supporting axles carrying the carriage and provided with supporting wheels traveling on said trackways, vertically-adjustable screws whereby the carriage is suspended from said axles, and feed mechanism for actuating the carriage.

64. In a cutting-off machine, in combination, a base, a feed carriage supported thereby and composed of a vertically disposed annular box having end openings, a horizontal hollow rotary drum extending centrally through and rotating in and carried by said box and provided with an exterior driving gear arranged on the drum intermediate its ends and inclosed by said box, and a cutter disk having a central work receiving opening, said disk spanning and fixed to said drum, said box providing bearings for said drum at opposite sides of said gear, the end walls of said box fitting around the circumferential end portions of said drum to approximately prevent escape of oil, the ends of said drum at the exterior of said box walls being provided with circumferential free liquid slinging edges.

65. A cutting off machine having a hollow open-end horizontal cutter disk drum provided with a cutter disk secured thereto and spanning the same and provided with a free circumferential liquid slinging edge, said drum being internally formed to discharge cutter lubricating and cooling liquid from the rear open end of the drum.

66. In a cutting-off machine, in combination, a support, and a rotary cutter disk carried thereby and provided with exterior driving means and having a circumferential liquid slinging edge, said disk provided with a central work receiving opening and a series of cutters arranged around and projecting into said opening.

67. A cutting-off machine comprising an annular hollow box providing main bearings for the cutter disk drum, and a hollow rotary cutter disk drum extending through and mounted in said box and provided with driving means, said drum having circumferential cylindrical end portions formed with annular oil collecting and slinging grooves, said box having portions fitting around said cylindrical portions of the drum and forming running joints in connection therewith and providing annular oil receiving recesses about said grooves.

68. A cutting-off machine comprising a hollow annular box providing main bearings for the cutter disk drum, and a rotary hollow cutter disk drum having a cutter disk secured to an end thereof and spanning the same, said drum having circumferential water collecting and slinging exterior portions and provided with cylindrical portions between said ends, said drum extending through and mounted in said box, said box providing water catching overhangs over and spaced from said portions, said drum having its end portions fitting about said cylindrical portions of the drum.

69. In a cutting-off machine, in combination, a base, a vertically-disposed hollow casing having an intermediate horizontal open-

ing extending completely therethrough transversely of the base and extending above the horizontal plane of the top edges of the adjacent portions of the base, a horizontal hollow rotary drum extending through said opening, said casing surrounding said drum and providing bearings therefor, and a cutter disk spanning said drum and secured thereto and having a central work-receiving opening and cutters around the same.

70. In a cutting off machine, in combination, a base having spaced side walls, a vertically-disposed hollow casing, a hollow rotary drum extending transversely and horizontally through said casing and arranged transversely of said base, said drum being surrounded by said casing and rotating therein, said casing providing bearings for said drum, a cutter disk secured to and spanning said drum and provided with a central work-receiving opening and cutters projecting thereinto, and means to support the work transversely of and above said side walls and extending longitudinally into said drum and through said central work-receiving opening.

71. In a cutting off machine, in combination, a base having vertical spaced side walls, a vertically-disposed hollow casing supported and movable between said walls, feed mechanism for actuating said casing on its feed and return strokes and comprising a horizontal feed shaft forming no part of the casing support, a hollow rotary drum extending transversely and horizontally through said casing and arranged transversely of said base, said drum being surrounded by said casing and rotating therein, said casing providing bearings for said drum, a cutter disk secured to and spanning said drum and provided with a central work-receiving opening and cutters projecting thereinto, said drum provided with exterior driving gearing, actuating means meshing with said gearing to rotate said drum in said casing, and means to support the work transversely of and above opposite portions of said side walls and extending longitudinally into said drum and through said central work-receiving opening.

72. In a metal cutting off machine, in combination, a base, a hollow casing movably carried thereby, feed mechanism for moving said casing on its feed and return strokes, a hollow rotary drum extending horizontally through said casing, said casing surrounding said drum and providing bearings therefor, a cutter disk secured to and spanning said drum and provided with a central work-receiving opening and cutters projecting thereinto, gearing in said casing exteriorly applied to said drum for rotating the same, and means extending into said casing for driving said gearing.

73. In a metal cutting-off machine, in

combination, a base, a hollow casing movably carried thereby, feed mechanism for moving said casing on its feed and return strokes, a hollow rotary drum extending horizontally through said casing, said casing surrounding said drum and providing bearings therefor, a cutter disk secured to and spanning said drum and provided with a central work-receiving opening and cutters projecting thereinto, said drum provided with an exterior driving gear within said casing, a driving pinion in mesh with said gear and located at the edge portion of said casing, and means for driving said pinion.

74. In a metal cutting off machine, in combination, a base, a hollow casing, a hollow rotary drum extending transversely and approximately centrally through said casing and rotating therein, said casing providing bearings for said drum, said drum provided with an exterior driving gear within said casing, means for driving said gear, said means extending from the exterior of the casing into the casing and comprising a pinion in mesh with said gear, said casing receiving the thrust of said drum in action, and a cutter disk secured to and spanning said drum and provided with a central work-receiving opening and cutters projecting thereinto.

75. A metal cutting off machine, in combination, with a track leading thereto, a work-carrying wheeled trolley movable on said track and provided with a work clamp, a rack arranged longitudinally of and fixed to said track, said trolley provided with a transverse shaft having means whereby the same can be turned by hand, and gearing from said shaft to and traveling on said rack.

76. A cutting off machine, in combination with a track leading thereto, a work trolley movable on said track toward and from said machine, a stop arranged on said track behind said trolley with respect to said machine, said stop being adjustable longitudinally of the track and provided with a clamp for securing the same to the track in the desired adjustment, and means cooperating with the trolley and stop for limiting the work-feeding movement of the trolley.

77. A cutting off machine having a rotary cutting off saw and alined work supports at the front and rear faces of said saw, in combination with a fixed track, a work carrying trolley movable on said track to feed the work forward over said supports, and means determining the length of each forward feeding stroke of the trolley comprising an adjustable stop for said trolley.

78. A cutting off machine having a rotary cutting off saw and a work clamp, in combination with a track leading to said clamp, a work carrying trolley movable on said

track to move the work forward through said clamp and across the path of the saw, means for manually propelling said trolley along said track comprising a hand wheel and gearing carried by the trolley, and adjustable means for predetermining the length of feeding stroke of the trolley.

79. In a cutting off machine, in combination, a base, a carriage, a hollow rotary drum extending transversely through said carriage, a saw blade spanning and secured to said drum and having a center work-receiving opening and cutters, said carriage providing bearings for said drum, driving means for the drum, and a work support extending longitudinally into said drum approximately to the side face of the saw.

80. In a cutting off machine, in combination, a base having longitudinal side walls provided with horizontal slideways, a feed carriage arranged between said walls and having portions supporting the carriage and movable along said slideways, feed mechanism for reciprocating said carriage on its feed and return strokes, said carriage comprising a vertically disposed annular casing, a hollow rotary drum extending transversely through said casing and rotating on an axis arranged transversely of said side walls and above the horizontal plane of the adjacent upper portions of said side walls, a saw blade spanning and secured to said drum and having a central work receiving opening and cutters, driving means for said drum comprising an exterior gear rigid

with the drum and inclosed within said casing, and means for supporting the work transversely of said side walls and within said drum.

81. In a cutting off machine, in combination, a vertically disposed annular casing, a rotary hollow drum extending there-through, said casing providing bearings for said drum, driving means for said drum comprising a gear inclosed within said casing, a saw blade spanning said drum and provided with a central work receiving opening and cutters, and means providing receptacles below the ends of said drum to catch the refuse and cutter cooling liquid falling therefrom and a tank to receive the liquid from said receptacles.

82. In a cutting off machine, in combination, a hollow base having an open top, a feed carriage supported by said base and arranged in the open top thereof, a hollow rotary drum extending transversely through said carriage and provided with driving means, and a saw blade secured to and spanning said drum and having a central work receiving opening and cutters, said base providing means arranged below the ends of said drum to catch the refuse and cutter cooling liquid discharged therefrom.

In testimony whereof I affix my signature, in presence of two witnesses.

GEORGE GORTON.

Witnesses:

C. R. CARPENTER,
CORA EILANDSON.