

Sept. 10, 1968

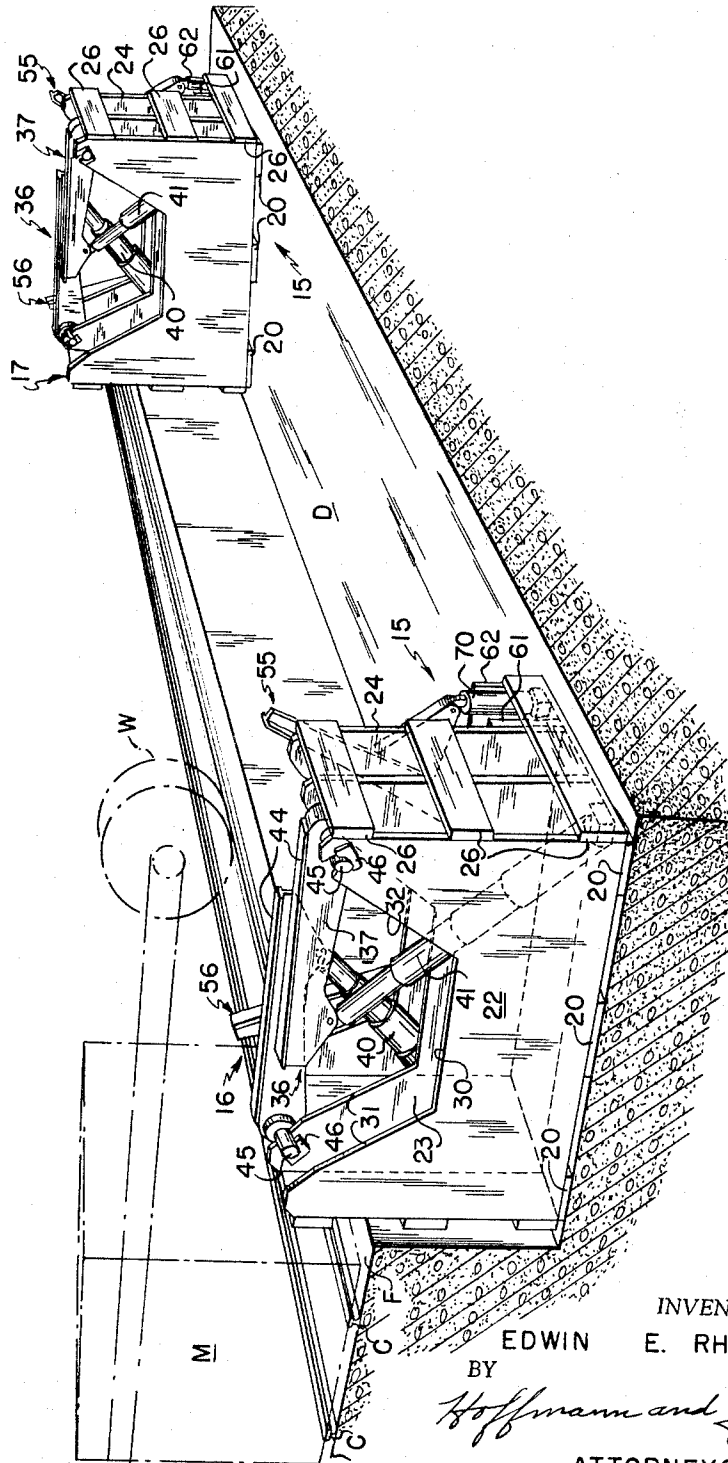
E. E. RHOADS

3,400,835

BILLET TURNING APPARATUS

Filed Oct. 7, 1965

4 Sheets-Sheet 1



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3,400,835

BILLET TURNING APPARATUS

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4 Sheets-Sheet 2

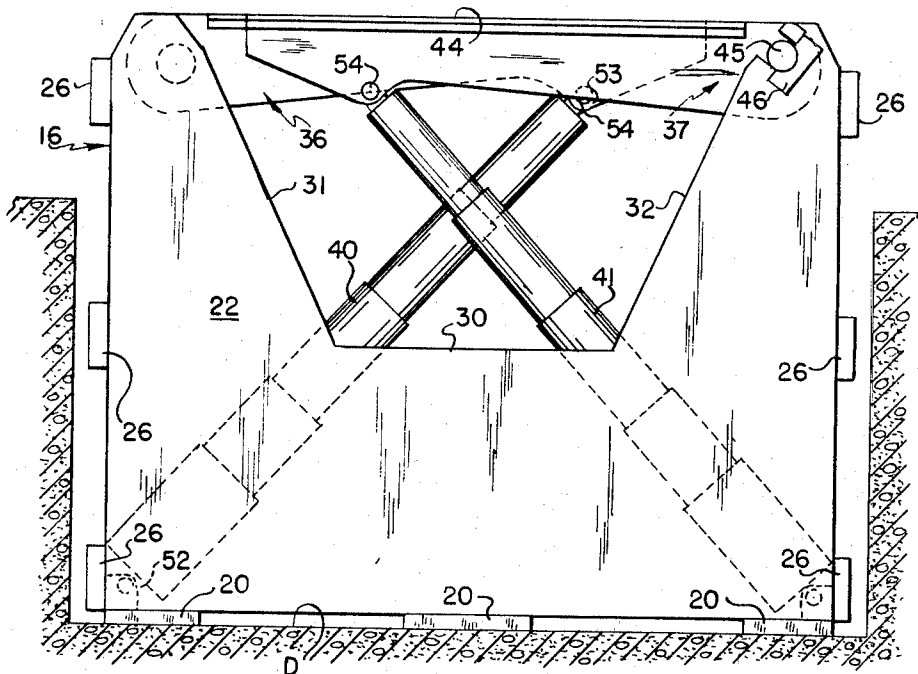


FIG. 2

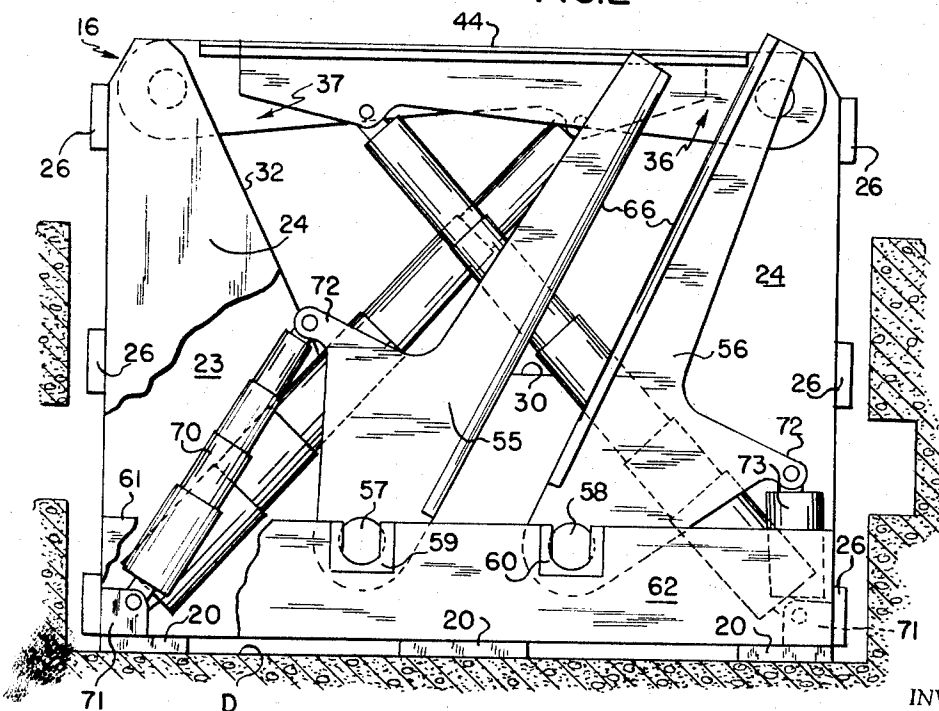


FIG. 3

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Sept. 10, 1968

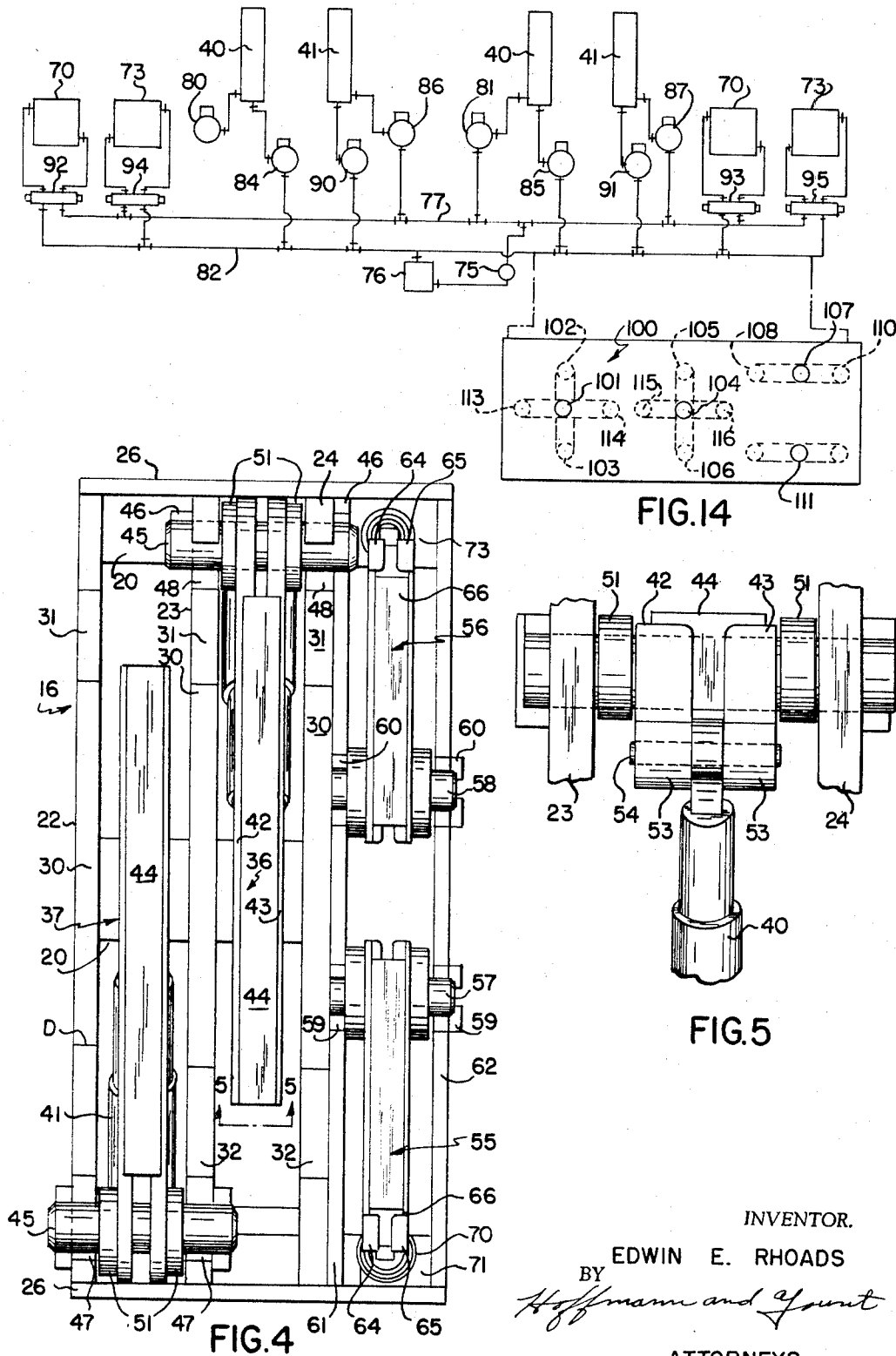
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

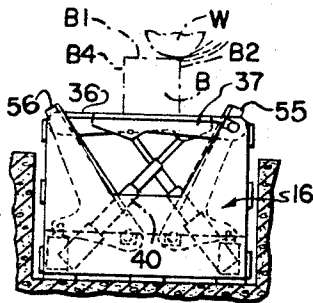


FIG. 6

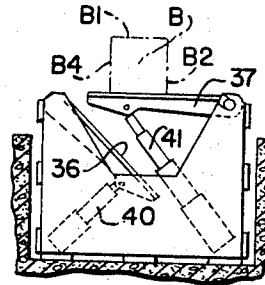


FIG. 7

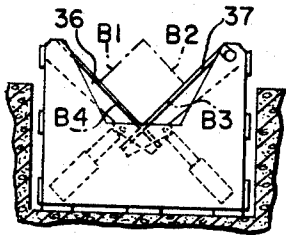


FIG. 8

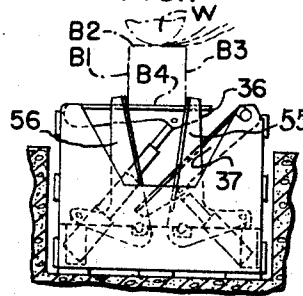


FIG. 9

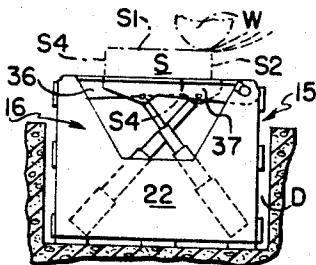


FIG. 10

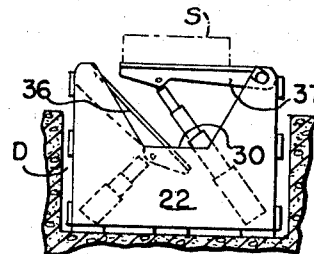


FIG. 11

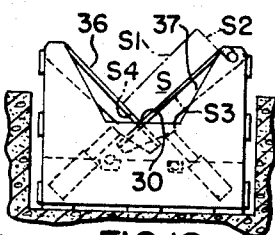


FIG. 12

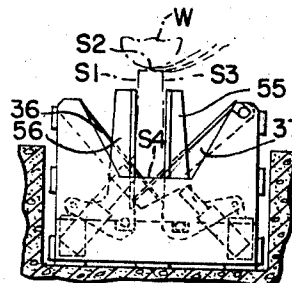


FIG. 13

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3,400,835

BILLET TURNING APPARATUS

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Filed Oct. 7, 1965, Ser. No. 493,733

9 Claims. (Cl. 214—1)

ABSTRACT OF THE DISCLOSURE

A billet turning apparatus comprised of interdigitating billet supporting arms extending inwardly from opposite sides of the apparatus with the arms being operable by power to lowered inclined positions which face each other with the arms moving on one side of the apparatus being operable independently of the arms of the opposite side of the apparatus. Power operated clamp arms are provided for moving a billet on the billet supporting arms and holding the billet in an upright position when the billet is lowered to rest on a billet support member disposed below the billet supporting arms.

The present invention relates to apparatus for manipulating billets, slabs and like workpieces for turning and positioning the work to present various surfaces of the work for processing or inspection thereof.

The principal object of the present invention is the provision of a new and improved apparatus for turning billets and the like which is rugged and dependable in operation and which is capable of turning workpieces of widely varying sizes and cross-sectional configurations, including slabs and circular forms, without altering or adjusting the apparatus and which is capable of turning the workpieces in either direction, as desired.

More specifically, an object of the present invention is the provision of an apparatus for turning billets and the like comprising two billet supporting members either of which may support a billet extending transversely thereof, and which members may be tilted in parallel vertical planes towards a plane extending transversely thereof and between the outer ends of the support members whereby a billet supported by a first member may be turned by sequentially tilting the members from a generally horizontal position and return so that the billet tilted by the first member is transferred, while partially turned, to the second member and is completely turned as the second member resumes its generally horizontal position.

A further object of the invention is the provision of a new and improved apparatus of the character mentioned having a billet supporting means beneath the tiltable members for supporting a billet which may be positioned thereon by tilting both of the supporting members towards the other.

A still further object of the invention is the provision of a new and improved apparatus of the character mentioned having upwardly extending abutment means moving laterally of the horizontal plane of the billet supporting members for engaging a billet supported by the apparatus to shift and firmly position the billet on the billet supporting members.

Other objects and advantages of the invention will be apparent from the following description of a preferred form thereof, reference being made to the accompanying drawings wherein:

FIG. 1 is a perspective view, partly broken away, of a billet turning and positioning apparatus installed adjacent to a grinding machine for positioning billets and slabs relative to the machine, which is shown schematically;

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FIG. 2 is an end elevational view of one unit of the billet positioning and turning apparatus;

FIG. 3 is an elevational view of the end of the billet turning apparatus opposite the end shown in FIG. 2, certain parts being shown broken away;

FIG. 4 is a plan view of the apparatus shown in FIGS. 1-3 turned 90° and showing a clamping member in a different position;

FIG. 5 is a fragmentary view taken substantially along line 5—5 of FIG. 4;

FIGS. 6, 7, 8, 9 are schematic drawings illustrating positions of certain parts of the apparatus during turning of a billet about its longitudinal axis for presenting a fresh side for grinding by the grinding machine;

FIGS. 10, 11, 12, 13 are views similar to those of FIGS. 6, 7, 8 showing a slab turned for repositioning relative to a grinder wheel of the grinding machine; and

FIG. 14 is a schematic view of the hydraulic control system for the billet turning apparatus.

The form of the invention shown in the drawings comprises an apparatus 15 for positioning and turning billets and slabs, the surfaces of which are to be ground by the wheel W of a grinding machine M. It will be understood, however, that the invention could be embodied in various other apparatus wherein it is desirable to turn a workpiece about its longitudinal axis and to firmly position the piece for a work operation.

Referring to the drawings, the grinding machine M, which is shown schematically, is supported on a suitable foundation F having a railway track C along which the grinder may be moved to grind surfaces of elongated metal billets and slabs. A trench-like pit D is provided along side the track C and the apparatus 15 rests on the floor of the pit.

The apparatus 15 includes two similar work supporting and manipulating units 16, 17, which are spaced apart a distance suitable for supporting opposite end portions of the particular billets or slabs to be ground by the grinder M. Because both units are of like construction, the structural details and operation of the unit 16 only is described herein, and it will be understood that one or more like units could be placed intermediate the two units 16, 17 for supporting intermediate portions of the work. Also, if desired, a suitable support for the intermediate portions of the workpieces could be installed.

Referring particularly to FIGS. 1 through 5, unit 16 comprises a frame formed of three parallel base members 20 which rest on the floor of pit D and on which the lower edges of upright transverse frame plates 22, 23, 24 rest. The transverse plates 22, 23, 24 are supported in vertical spaced planes by horizontally extending spacer bars 26 which are welded to the opposite side edges of the plates, as shown.

Each of the transverse plates 22, 23, 24 has a generally U-shaped configuration by which a recess is provided having a horizontally lower edge 30 and two upwardly sloping edges 31, 32, the respective edges of the recesses lying in common planes. The angles of the edges 31, 32 to horizontal are preferably in order of 65°.

Two billet supporting arms 36, 37 are each pivoted at one end thereof to opposite sides of the frame and are movable about their pivots by hydraulic piston-type motors 40, 41, respectively, between a horizontal position and a lowered position in which the upper surfaces of the arms lie at least in the planes of the respective edges 31, 32 of the recesses in the plates 22, 23, 24. By the construction described, the arms 36, 37 can be tilted towards a vertical plane extending transversely of the arms and intermediate the outer ends thereof.

Each arm 36, 37 is formed of two spaced plates 42, 43 having a wear plate in the form of a hardened T-shaped rail section 44 supported therebetween with the vertical

web thereof embraced between the sides of the plates and the cross flange forming a hard and durable billet supporting surface above the top edges of the plates. The rail sections 44 may be removably attached in place by any suitable means, such as bolts which are not shown.

The arms 36, 37 each has a pivot pin 45 which extends through openings through the plates 42, 43 thereof and the ends of which are supported in bearing blocks 46 attached to the plates 22-24 adjacent pairs of notches 47, 48 formed in the respective transverse frame plates. Arm 36 is pivoted in this manner between plates 23, 24, and arm 37 is likewise pivoted between plates 22, 23. Spacer members 51 are interposed between the sides of the arms 36, 37 and the frame plates between which the respective arms are pivotally supported.

The arm 36 is adapted to be swung about its pivot pin 45 by the hydraulic motor 40 which is of the well known telescoping cylinder and piston type, the lower end of which is pivotally secured to a block 52 attached to the frame plates 20, 26 and the upper end of which motor is pivotally attached to two lugs 53, formed on the bottom edges of the plates 42, 43 of the arm, by a pin 54, as shown. Arm 37 is similarly attached to the motor 41 which is like motor 40 and is attached at its lower end to the base plate 20 on the left-hand side of the frame in a manner like that described with reference to motor 40.

It will be understood that the motors 40, 41 are supplied with hydraulic fluid through suitable control valves and conduits, described hereinafter, by which the motors can be individually extended and retracted to position the arms 36, 37 horizontally or to lower them about their pivots to an angle at least equal to that of the sloping sides 31, 32 of the respective transverse plates 22-24. Furthermore, it will be noted that the pivots for the arms 36, 37 and the length of the arms are such that when the arms are parallel, they extend alongside one another for a major portion of their length so that either arm or both arms can support a billet extending transversely of the arms.

Referring particularly to FIG. 3, two upwardly extending clamp arms 55, 56 are each pivotally supported at their lower ends by bearing pins 57, 58 resting in bearing blocks 59, 60 attached to two transverse plates 61, 62 supported in vertical planes and resting on the base members 20. The upper edges of plates 61, 62 are below the level of the edges 30 of plates 22, 23, 24 and these edges are notched to receive the U-shaped bearing blocks 59, 60 for supporting the pins 57, 58 of the respective clamp arms. The ends of the plates 61, 62 are welded to the longitudinal side frame members 26 for support.

Each of the clamp arms 55, 56 are formed of two parallel members 64, 65 between which the vertical web of relatively hard rail-like T sections 66 are secured so that the cross flange rests on the inner facing edges of the clamp arm members, as shown, and form hard and durable supporting surfaces. The edges of the members 64, 65 beneath the cross flange of members 66 are rounded to receive the rounded undersurfaces of the T-shaped members. Preferably, the rail sections 44 and 66 can be interchanged in their respective arm structures.

The pivots for the clamp arms 55, 56 are positioned so that the arms may be swung outwardly and position the outer surfaces of the rail sections 66 in the planes of the sloping edges 31, 32 of the transverse frame plates 22, 23, 24.

Clamp arm 55 is swung about its pivot pin 57 by a double acting telescoping piston-type hydraulic motor 70, the base end of which is pivotally attached to a block 71 secured to the left-hand base members 20, 26 as viewed in FIG. 3, and the outer end of the piston motor is pivotally attached to the arm between two lugs 72, only one of which appears in the drawings, formed integral with the lower edges of the members 64, 65 comprising the arm.

Clamp arm 56 is swung about its pivot pin 57 by a double acting hydraulic motor 73 which is like motor 70 and which is attached to the frame and the arm in like manner, the similar parts having the same reference characters. The motors 70, 73 are attached by suitable valves and conduits to the hydraulic system of the apparatus as is described hereinafter, so that the clamp arms 55, 56 may be swung from their outer positions, as illustrated by arm 56 in FIG. 3 to an inward position illustrated by arm 55.

It will be understood that the respective arms 36, 37, 55, 56 of both units 16 and 17 are operated in unison so that a billet or slab extending between and supported by the two units are operated at each supported portion thereof in like manner.

The hydraulic system for actuating the motors 40, 41, 70, 73 comprises a motor driven hydraulic fluid pump 75 which receives oil from a reservoir 76 and discharges it at a high pressure into a suitable conduit or line 77. High pressure oil or fluid in line 77 is directed into the cylinders of motors 40 of the units 16, 17 through normally closed solenoid valves 80, 81 respectively, to raise the arms 36, and the fluid is drained from these motors into the reservoir 76 through a return conduit 82 through normally closed solenoid valves 84, 85, respectively to lower the arm.

Likewise, motors 41 of the units 16, 17 are connected to the high pressure fluid conduit 77 through normally closed solenoid valves 86, 87, respectively, to provide fluid to raise the arms 37, and fluid is drained from the motors into conduit 82 through normally closed valves 90, 91, respectively, to lower the arms 37.

The clamp arm motors 70 of the units 16, 17 are connected to the conduits 77 and 82 through solenoid operated four-way valves 92, 93, respectively, each having opposed solenoids one of which, when energized, actuates the valve to admit fluid under pressure into one end of the cylinders while draining the opposite end of the cylinders, and this motor action is reversed when the other solenoid is energized. The clamp motors 73 of the units 16, 17 are similarly controlled by four-way valves 94, 95. When the solenoids of the valves 92, 93, 94, 95 are de-energized the pistons of the motors are locked in position because the valves close both the inlet and outlet to and from the respective motors. Valves of the character mentioned are well known in the art and further description thereof is deemed unnecessary.

The solenoid valves are controlled by conventional switch means 100 located on a control panel, not shown, which may be located so that the operator may observe the action of the billet turning apparatus for proper actuation of the switch means.

The solenoid valves for the hydraulic motors for actuating the arms 36, 37 are controlled by switch means 100 which includes a control lever 101 normally biased to a neutral position shown in full lines. To elevate the arms 36, lever 101 is moved to position 102 which energizes valves 80, 81. When control lever 101 is moved to position 103, valves 84, 85 are energized which causes the arms 36 to be lowered. A second control lever 104, similar to lever 101, causes valves 86, 87 to be energized and cause arms 37 to be raised when the lever is moved to position 105 and when the lever is moved to position 106, the valves 90, 91 are energized which causes the motors 41 to permit the arms 37 to swing downwardly.

The switch means 100 includes a third control lever 107 which is normally biased to a neutral position shown in full lines and when shifted to position 108 energizes the valves 92, 93 to cause the motors 70 to swing clamp arms 55 inwardly, and when the lever is shifted to position 110 causes the valves to be energized to actuate the motors to move the clamp arms outwardly. A fourth switch lever 111 controls the valves 94, 95 in a similar fashion to cause the motors 73 of the units 16, 17 to actuate the clamp arms 56.

In the event the billet on the arms 36, 37 is warped, it is desirable to be able to adjust the heights of the arms 36, 37 of the unit 16 independently of moving the arms 36, 37 of the unit 17 by controlling the valves 80, 84 independently of valves 81, 85 and of each other. This may be accomplished, for example, by shifting switch control lever 101 to positions 113 or 114, respectively to move the arm 36 of the unit 16 up or down respectively by energizing the valve 80 or 84, respectively, or by operating control lever 104 to position 115 or position 116 to raise or lower the arm 37 of unit 16 by operating the valve 86 or 90 respectively.

Referring to FIGS. 6, 7, 8 the operation of the apparatus is illustrated with reference to rotation of a billet B which is rectangular in cross section, and which has been positioned to extend transversely of the arms 36, 37 of both units 16, 17 (only unit 16 appearing in the drawings) and supported thereon so that its surface B1 may be ground by the grinding wheel W of grinding machine M. In FIG. 6, the motors 40, 41 are extended to position the arms 36, 37 horizontally and the clamp arms 55, 56 are withdrawn outwardly by retraction of the motors 70, 73, respectively, although they could be moved so as to engage and clamp the billet therebetween.

Assuming that it is desirable to rotate the billet B 90° counterclockwise to present surface B2 thereof to the grinding wheel, motors 40 are retracted to lower arms 36 to a convenient angle so that the billet is then supported by the arms 37 of the units, as seen in FIG. 7, which arms are then lowered to tilt the billet towards the arms 36, and when a certain degree of tilt is achieved, such as 45°, the billet will tumble against the upper surfaces of arms 36, as seen in FIG. 8, which arms may then be swung to horizontal by motors 40 causing the billet to rest on the face B4, which was presented to the arms 36 by the tilting of the arms 37 just described, whereby side B2 is uppermost for work thereon by the grinding wheel, as seen in FIG. 9.

If it is desired to rotate the billet in the opposite direction to present side B4 to the grinding wheel W, for example, it will be appreciated that the arms 37 are first lowered from horizontal position to a convenient angle after which arms 36 are lowered to tilt and tumble the billet onto the arms 37, after which the arms 37 are raised and engage the tilted side B2 of the billet and upon movement of the arms 37 to horizontal, side B4 will be uppermost.

The billet may be firmly clamped in a given position on the horizontally extending arms 36, 37 by swinging the clamp arms 55, 56 inwardly to engage opposite sides of the billet, as seen in FIG. 9, and firmly grip the billet and hold it in place. Also, the clamp arms can be utilized to slide the billet laterally and position it on the arms for alignment with the grinding machine or the clamp arms may form stops to limit sliding of the billet when the arms are tilted.

It will be appreciated that in the event the cross-sectional form of the billet to be worked is round or has more than four sides, such as a hexagonal shape, the arms 36, 37 need only be lowered to the extent that the billet can be tilted or turned initially through approximately one-half the angle it is desired to be turned ultimately so that when it is transferred from one set of arms to the other and raised to the horizontal position the desired surface is uppermost. The swinging of the arms 36, 37 can be controlled so that both sets of these arms can support the billet while the arms are tilted and thereby position the billet at a selected elevation lower than that of which the billet is supported when the arms are horizontal.

The apparatus 15 is equally adaptable for handling and turning relative flat slabs, and referring to FIGS. 10 to 13, a slab S is shown supported on the arms 36, 37 of the units 16, 17 of apparatus 15 so that a broadside S1 thereof may be worked on by the grinding wheel W. When

it is desired to work on the edge S2 of the slab, arms 36 are lowered to their lowermost positions and arms 37 are then lowered to tilt the slab toward the arms 36 and to bring the lower edge S4 of the slab to rest on the horizontal surfaces 30 of the transverse plates 22, 23, 24, after which the clamp arms 55 are swung inwardly which raise the slab on its lower edge to a vertical position and the other clamp arms 56 may then be brought inwardly against the slab to cooperate with the other clamp arms and clamp the slab in a position in which the side S4 rests on the supporting surfaces 30 and the side S2 is presented to the grinding wheel W.

After the upper edge S2 has been ground, it will be apparent that the slab may then be tilted toward the arms 36 which are in their lowermost positions, by counterclockwise movement of the clamp arms 55, 56 as viewed in FIG. 13, and when the slab has been deposited with its broadside S1 resting on edges 31 of the plates 22, 23, 24, the two clamp arms may then be swung to their outermost positions after which the slab may be elevated to a horizontal position on the arms 36, whereby the side S3 of the slab S will be presented to the grinding wheel.

In handling the slab by the clamp arms 55, 56 assistance in properly positioning the slab in its vertical position can be obtained by the use of the arms 36, 37, respectively, as conditions dictate.

There are times during the manipulation of a slab or billet when the simultaneous operations of the clamp arms 55 for engaging one side of the billet or slab and the simultaneous operations of arms 56 for engaging the other side of the billet or slab will not effect the proper orientation of the billet on the support arms. Accordingly, control lever 107 may include a direction of operation transverse to that shown in FIG. 14 and similar to that shown for control lever 101 actuate the clamp arm 55 of only one of the units 16, 17 to move inwardly or outwardly. For example, the control lever 107 may be made to move upwardly as viewed in FIG. 14 to cause the clamp arm 55 of unit 16 to move inwardly and in a down direction to cause the clamp arm 55 to move outwardly. Similarly the control lever 111 could be provided with upward and downward movement as viewed in FIG. 14 to operate the clamp arm 56 of unit 16 inwardly and outwardly with the control lever actuated in the corresponding direction. If desired, additional control levers can be provided to operate the clamp arms 55, 56 of the unit 17 independently of the clamp arms of unit 16 and of each other.

While certain modes of operating the support arms and clamp arms to manipulate the billet or slab have been described, it is to be understood that the support arms and clamp arms are capable of being operated in various ways to manipulate an object supported by the arms 36, 37. In certain instances, the object may be supported on the arms 36, independently of arms 37 and the arms 37 only used as tumbling members to effect a tumbling of the object as the arms 36 are lowered. For example, if arms 37 are lowered to a position somewhat greater than 45 degrees, depending in operation upon the shape and size of object being handled, an object such as a square shaped billet may be tumbled merely by dropping arms 36 so that the edge of the billet engages the arms 37 and causes the billet to tumble on the arms 36 as they are lowered to form a notch. The arms 36 can then be raised to lift the billet to table height with a new side and the clamp arms 55, 56 used to position the billet on the clamp arms 36. Operated in this manner, the direction of tumbling is normally in one direction only. By lowering the arms 36 to cause these arms to act as tumbling members for a square shaped billet supported on arms 37, the billet could be tumbled in the opposite direction by merely raising and lowering arms 37.

In addition, the clamp arms 56 can serve as both tumbling members and clamp arms. For example, the height of the arms 55, 56 can be such that they can be

moved under a billet or slab supported on the arms 36, the arms 37 being lowered, and the arms 36 then dropped to cause the billet to engage the top of clamp arms 55 along a side edge thereof to tumble toward the arms 36 as they are lowered and to present a new face upon subsequent raising of arms 36. Arms 55, 56 can be used to properly position the billet on the arms 36.

Accordingly, it can be seen that various modes of operation may be employed to manipulate an object supported on the support arms and that considerable flexibility results from the described arrangement. Additional flexibility may be provided by mounting the units 16, 17 on wheels which ride on tracks to support the units for relative movement toward and away from each other. A locking means can be provided to lock units in position on the tracks.

It will be seen that the invention provides apparatus of relatively simple and economical construction which efficiently manipulates billets, slabs and other forms of heavy elongated members of enumerable cross-sectional shapes and dimensions and has a high degree of flexibility as to the direction and degree of angularity in which the workpieces may be rotated and held for working or the like. Although but one form of the invention has been described, it is to be understood that other forms, modifications and adaptations could be made all falling within the scope of the claims which follow.

Having described my invention, I claim:

1. Apparatus for turning billets or the like comprising, a frame having support members at opposite sides thereof and an opening intermediate said support members, two billet supporting arms, means pivoting one end of each of said arms to a respective one of said support members for swinging in parallel vertical planes extending transversely of said opening between said members to lower a billet supported thereon, power means for moving said arms about their pivots independently of each other between a generally horizontal position and a downwardly inclined position facing said opening whereby the arms may be inclined to tilt the billet to engage a different side of the billet with an inclined one of said billet supporting arms to position a different billet side upwardly on the return of the arms to a horizontal position, a clamping arm pivoted on said frame below said arms and movable in a vertical plane and when in an upright position extending above said horizontal plane of said billet supporting arms, and means to swing said clamping arm about its pivot.

2. Apparatus for turning billets or the like comprising, a frame having support members at opposite sides thereof and an opening intermediate said support members, two billet supporting arms, means pivoting one end of each of one said arms to a respective one of said support members for swinging said arms in parallel vertical planes extending transversely of said opening between said members, power means for moving said arms about their pivots independently of each other between generally horizontal positions downwardly inclined positions facing said opening whereby the arms may be inclined to tilt the billet to engage a different side of the billet with an inclined one of said billet supporting arms to position a different billet side upward when the arms are returned to a horizontal position, two clamp arms pivoted to said frame below the pivots for said billet supporting arms, said clamp arms being pivoted to swing parallel to the plane of movement of said billet supporting arms and to extend above the generally horizontal plane of said billet supporting members when said clamp arms are in vertical positions, and power means to swing said clamp arms between inclined positions on opposite sides of vertical.

3. Apparatus for turning billets or the like comprising frame structure having two upright parts at opposite sides thereof interconnected by a support structure below said upright parts, a billet supporting arm pivoted to

each upright and swingable in a vertical plane between a generally horizontal position in which said arms extend in the direction of the opposite upright frame part and downwardly inclined positions facing said opening whereby the arms may be inclined to tilt the billet to engage a different side of the billet with an inclined one of said billet supporting arms to position a different billet side upward when the arms are returned to a horizontal position, two extendable power means attached at one end to the respective arms and attached at the opposite ends to opposite side portions of said frame and operative to swing said arms independently of one another between said horizontal and inclined positions, the inner sides of said upright parts of said frame forming opposed upwardly extending abutments, two clamp arms pivotally attached to said support structure below said uprights on axes parallel to the axes of the pivots for said billet supporting arms and intermediate vertical planes through the pivots of said arms, said clamp arms adapted to extend above the horizontal plane of said support arms, and power means to swing said clamp arms about their pivots.

4. Apparatus for turning billets and the like comprising a frame including three upright plates aligned in spaced parallel planes, said plates having recesses extending from the top edges and sloping inwardly and downwardly and terminating in a horizontal transverse section, the edges of said recesses being aligned horizontally, a first support arm, means pivoting said first arm between first and second of said plates adjacent the tops thereof and at one side of said recesses to extend inwardly therefrom, a second support arm, means pivoting said second arm between said second and third of said plates and adjacent the tops thereof at the opposite side of said frame to extend inwardly therefrom, power means for swinging said arms independently of each other about their pivots from a horizontal position in which said arms extend substantially across said recesses to a position substantially flush with the planes of the sides of said recesses whereby the arms may be inclined to tilt the billet to engage a different side of the billet with an inclined one of said billet supporting arms and a different side disposed upwardly upon the return of the arms to a horizontal position, first and second clamping arms, means pivoting said clamping arms beneath said horizontal transverse sections of said recesses in said plates and between vertical planes through said pivot means for said arms, the pivots for said clamping arms being spaced in a horizontal plane and said clamping arms being adapted to extend above the horizontal plane of said first and second support arms, and power means to move said clamp arms about their pivots.

5. Apparatus for turning billets comprising spaced billet support members supported on each of two opposite sides of said apparatus and having first positions extending inwardly from the opposite sides of said apparatus to terminate in free inner end portions and to form generally horizontally extending overlapping billet support surfaces which are adapted to engage the billet to support the latter, frame means extending downwardly from said billet support members on the opposite sides of the apparatus for mounting the support members, means connecting said billet support members to said frame means for tilting movement in generally vertical planes extending between said sides of said apparatus to relatively lower and to raise the inner and outer end portions respectively of the members to move said supporting surfaces toward a facing relationship whereby the inner end portions of the support members and a billet thereon may be lowered below said first positions of the support members to tilt the billet supported by said members and to engage the billet support members on one side of the apparatus with a different side surface of said billet and effect a turning of the billet upon return of said billet support members to their said first

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position, and power means for moving the billet support members on one side of the apparatus independently of those on the other to operate said support members to effect a turning of a billet.

6. An apparatus as defined in claim 5 wherein said power means includes means for moving the billet support members on the same side of the apparatus independently of each other with power.

7. An apparatus as defined in claim 5 wherein said frame means defines a recess into which a billet is lowered on the tilting of the billet support members, said apparatus including spaced support means below said billet support members for supporting a lowered billet on a side edge, and power operated clamp means for holding the billet upright on said support means.

8. An apparatus for turning billets comprising spaced billet support members on each of two opposite sides of said apparatus and having first positions extending inwardly from the opposite sides of said apparatus to terminate in free inner end portions and form generally horizontally extending overlapping billet support surfaces which are adapted to engage the billet to support the latter, frame means extending downwardly from said billet support members on the opposite sides of the apparatus for mounting the support members, means connecting said billet support members to said frame means for tilting movement in generally vertical planes extending between said sides of said apparatus to relatively lower the inner end portions respectively of the members relative to their said first positions and to move said sup-

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porting surfaces toward a facing relationship whereby a billet on said members may be lowered below the said first positions of said members to tilt the billet supported by said members to engage a different side of the billet with the members on one side of the apparatus which are in an inclined lowered position and to effect a turning of the billet upon return of said billet support members to their said first position, and power means for moving the billet support members on one side of the apparatus independently of those on the other to operate said support members to effect a turning of a billet and means for moving the billet laterally on said billet support members.

9. An apparatus as defined in claim 8 wherein said billet support members are arranged in pairs of adjacent arms extending inwardly from the opposite sides of said apparatus at spaced locations and said power means comprises means for raising and lowering each pair of arms independently of the other pairs.

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