Aug. 2, 1949. W. E. KERR 2,477,879

DRAWBENCH

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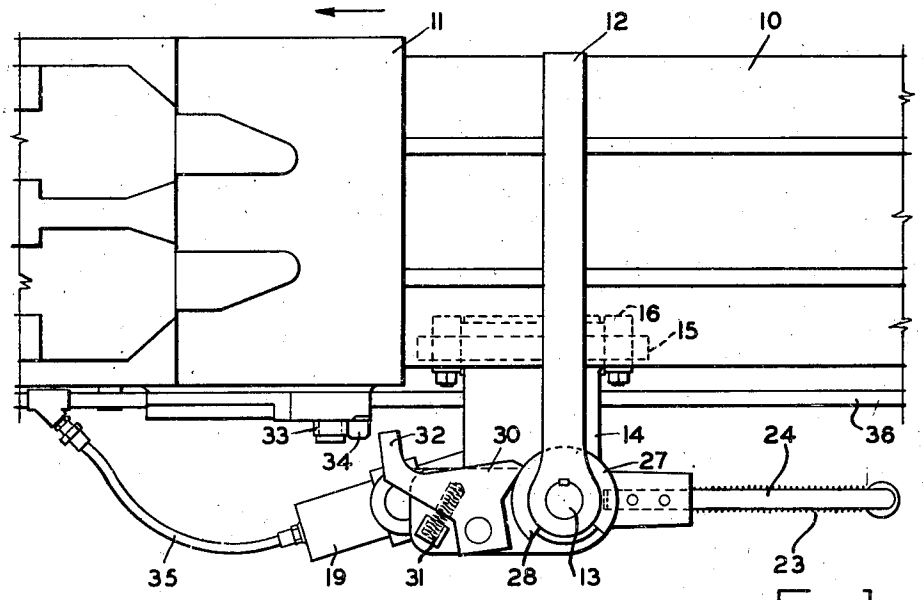


Fig 1

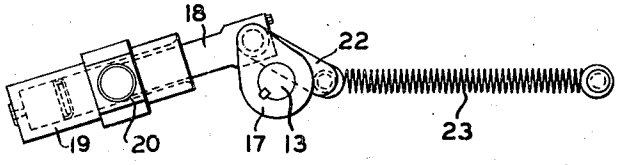


Fig 2

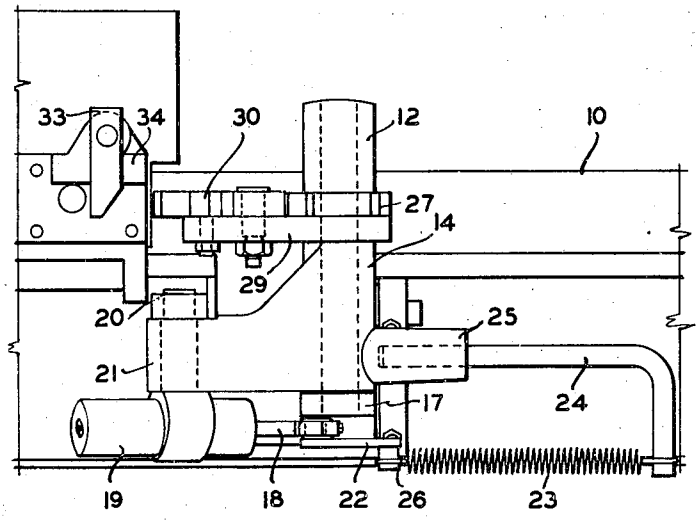


Fig 3

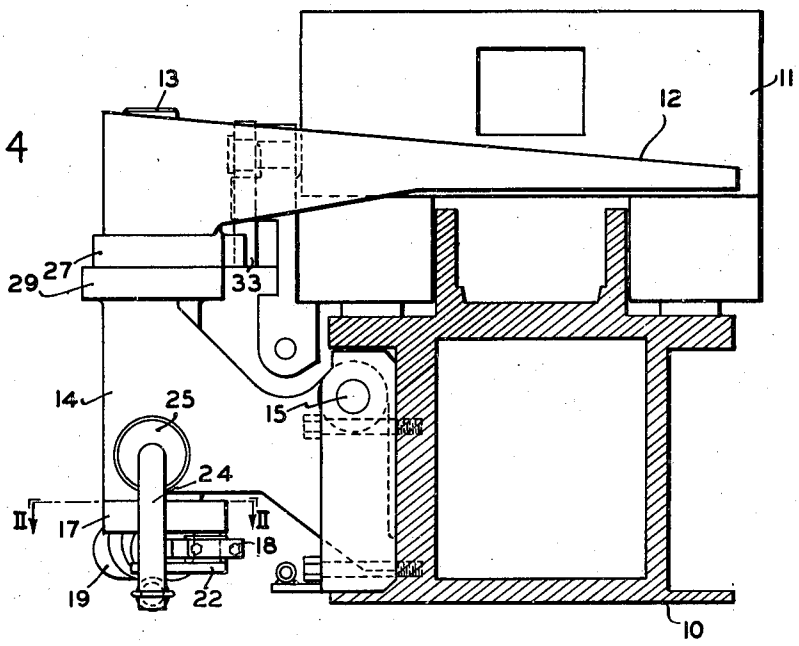
INVENTOR
WALLACE E. KERR
BY
Francis J. Klempay
ATTORNEY

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DRAWBENCH

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Fig 4



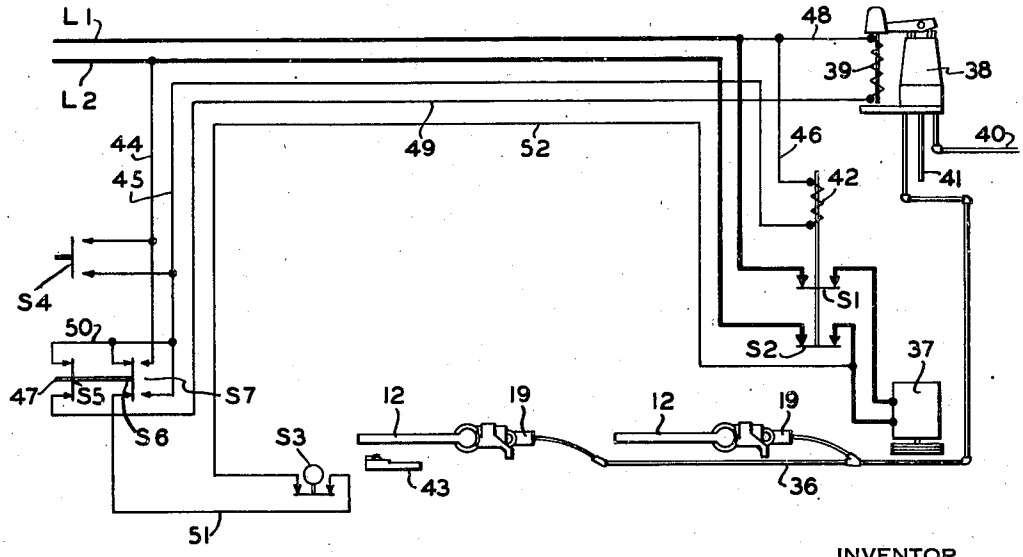


Fig 5

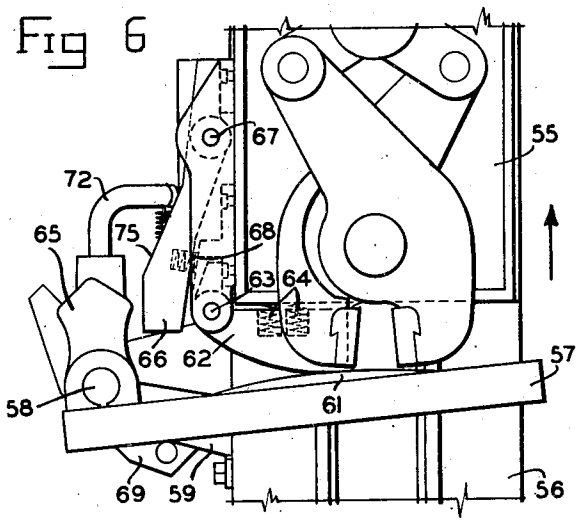
INVENTOR
WALLACE E. KERR
BY Francis J. Klempay
ATTORNEY

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DRAWBENCH

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Fig 6



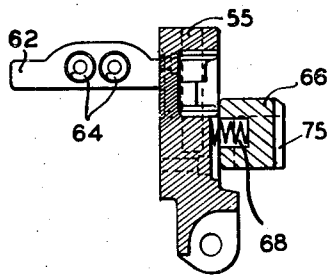


Fig 11

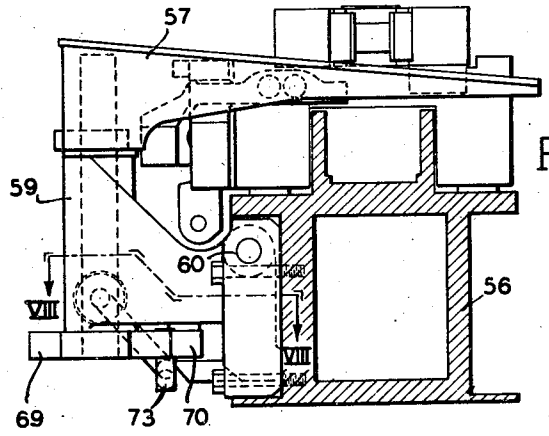


Fig 7

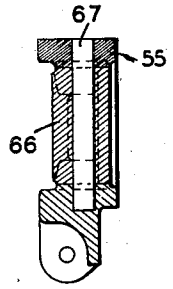


Fig 10

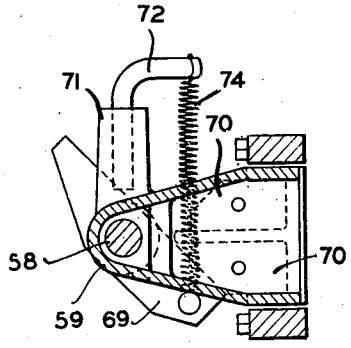


Fig 8

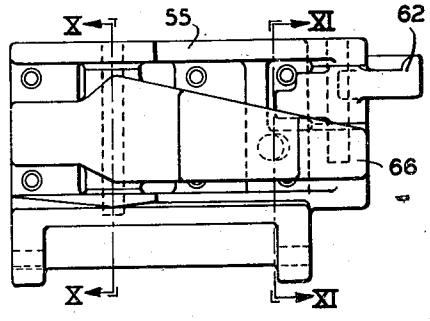


Fig 9

INVENTOR
WALLACE E. KERR

BY
Francis J. Klempay
ATTORNEY

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DRAWBENCH

Wallace E. Kerr, Youngstown, Ohio

Application March 27, 1942, Serial No. 436,436

9 Claims. (Cl. 205—3)

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This invention relates to apparatus for drawing metal tubes, rods, bars and the like and more particularly to drawbenches employing movable arms adapted to extend across the bench for the purpose of removing the tubes, rods or other drawn objects from the bench.

The principal object of the invention is the provision of improved arrangements for mounting and operating the arms aforesaid whereby the arms and their supporting, operating and other ancillary devices are subjected to less shock incident to the normal operation of the apparatus as a whole in order that the ruggedness and durability of the assembly may be increased.

A further object of the invention is the provision of an improved arrangement for mounting and operating the movable unloading arms whereby the mechanism required to achieve a desired mode of operation is substantially simplified and in which the mechanism itself is substantially less liable to damage by movement of the draw carriage upon failure of proper functioning of any of the parts or controls employed. In the preferred embodiment of the invention, which embodiment employs retractable arms normally biased to positions across the drawbench and having latch means to retain the arms in retracted positions, the principal objects of the invention are attained by so mounting the arms that the only obstruction to their movement are the latches mentioned. In this manner the arms are made free to move out of the way of the draw carriage regardless of its direction of travel and thus substantial breakage and damage during operation of the apparatus is avoided. In another form of the invention, the principal objects are attained by providing improved means to cushion the blows of the draw carriage, or any part mounted thereon, on the arms and to cushion the reactionary movement imparted to the arms.

Another object of the invention is to provide an unloading arm arrangement which is simple yet effective in operation but which nevertheless requires fewer and less complicated parts than any system heretofore devised for the purpose. To accomplish this object, arms having an inclined upper surface are mounted for rotation about vertical axes from across to the side of the bench and vice versa, biasing means are employed tending to maintain the arms across the bench, readily controlled retracting means is provided to move the arms to the side of the bench, and latches retain the arms in retracted positions individually for release by the draw

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carriage during its outward or drawing movement. The invention is also considered to reside in the instrumentalities employed to effect this mode of operation.

Yet another object of the invention is the simplification of the control of the retraction of retractable drawbench unloading arms so that immediately upon the initiation of the return movement of the draw carriage, the arms will be automatically moved to retracted positions. In one form of the invention, this operation is accomplished by employing the draw carriage return control element also as the control element for the retracting means.

The above and other objects and advantages of the invention will become apparent from a consideration of the following detailed specification and the accompanying drawings wherein there is specifically disclosed certain preferred embodiments of the invention.

In the drawings:

Figure 1 is a plan view of a drawbench unloading arm constructed in accordance with the principles of the invention;

Figure 2 is a plan view of a detail of the apparatus of Figure 1;

Figures 3 and 4 are side and end elevations, respectively, of the apparatus of Figure 1;

Figure 5 is a schematic showing of a portion of a drawbench control system which may be employed in a drawbench utilizing the arm construction of Figures 1 through 4;

Figures 6 and 7 are, respectively, plan and end views of a modified form of unloading arm and operating arrangement therefor;

Figure 8 is a section along the line 8—8 of Figure 7;

Figure 9 is a side view of a portion of the apparatus of Figures 6 and 7; and

Figures 10 and 11 are, respectively, sections along the lines 10—10 and 11—11 of Figure 9.

In the drawings, reference numeral 10 indicates a grip bit carriage supporting bench extending outwardly from the die or work head of the drawing apparatus, as is well understood in the art, and reference numeral 11 indicates a grip bit carriage which is moved outwardly along the bench to effect the draw by a chain or other suitable device, not shown. Spaced along the bench at suitable intervals, six feet, for example, are the unloading arms 12 and since these arms and their supporting and operating mechanisms are identical, but one is shown in detail in the drawings.

Arm 12 is provided with a sloping or inclined top surface, as shown in Figure 4, and is keyed to

a vertically extending shaft 13 which is rotatably mounted in a housing 14 having pivotal connection with the bench 10 by means of a horizontally extending pivot pin 15 which extends through an aperture of the housing bracket 14 and through apertures in members 16 rigidly bolted to the bench 10. The purpose of this pivotal connection between the bench 10 and the bracket 14 is to enable the arm and its supporting bracket 14 to rotate clockwise, as viewed in Figure 4, thereby allowing the arm 12 to move into supporting engagement with the top of the bench in the event a severe load is applied on the arm.

Secured to the lower end of shaft 13 is a crank 17 and connected with the crank pin is the piston rod 18 of a cylinder 19 which cylinder is carried by a pin 20 swivably mounted in a vertical bore through an extension 21 of the bracket 14. Integral with or rigidly secured to the outer end of the crank pin aforesaid is an arm 22 which is oriented with respect to the crank 17 in the manner clearly shown in Figure 2. Pivotally engaging the outer end of the arm 22 is a tension spring 23, the outer end of which is anchored to a bent rod 24 projecting outwardly from a socket 25 formed on the bracket 14. The parts 22, 13, and 12 are so angularly related that when the arm 12 extends at right angles to the longitudinal axis of the bench 10, the centers of the shaft 13 and the connection between arm 22 and spring 23 are in alignment with the axis of spring 23. Thus the spring 23 is operative at all times and in substantially any angular position of the arm 12 to urge the arm into discharging position as shown in the figures. By referring to Figure 3, it will be observed that the spring 23 is connected with the arm 22 by means of a pin 26 extending downwardly from arm 22 and it will be apparent that the arm 12 is free to rotate through any angular distance including one or more complete revolutions without interference by the spring 23 except the biasing action imparted hereby. Likewise, the crank connection between the shaft 13 and piston rod 18 also allows unlimited angular movement of the shaft and arm 12.

Also keyed to shaft 13 and positioned immediately below the hub of the arm 12 is a dog 27 having a latch engaging stop 28 and pivotally mounted on a shelf 29 formed with the bracket 14 is a latch 30 biased to stop engaging position by a spring 31. By referring to Figure 1, it will be apparent that arm 12 has unlimited rotation in a clockwise direction and may be rotated in a counterclockwise direction until stop 28 engages latch 30. Measured from the discharging position this latter rotation is approximately 270°. Latch 30 has an integral operating arm 32 adapted to be engaged by a gate-type of operator 33 pivotally mounted on the carriage 11. A block 34 prevents counterclockwise rotation of member 33, as viewed in Figure 3, and the member is free to rotate in the opposite direction.

Cylinder 19 receives fluid under pressure from a flexible conduit 35 which is connected with a supply pipe 36 extending longitudinally along the drawbench. Figure 1 shows the relative position of the parts after the carriage 11 has passed one of the arms and the gate 33 has released latch 30 to allow the spring 23 to rotate the arm 12 in a counterclockwise direction into the discharging position in which it is shown in the figure. The direction of draw is as indicated by the arrow in Figure 1. At the completion of the draw and at the start of the return movement of the carriage 11, it is desirable to move the arms 12 into

retracted positions out of the path of travel of the carriage so that the carriage may be quickly returned without colliding with any of the arms. This is accomplished, in accordance with the preferred embodiment of the invention, by supplying fluid pressure to the pipe 36 at this time and this pressure enters cylinder 19 through conduit 35 to move the piston rod 18 outwardly therefrom. This movement rotates the arm 12 clockwise a sufficient extent to allow the latch to fall in behind the stop 28 thus latching the arm in retracted position. Upon the return movement of carriage 11, the gate 33 overrides the latch arm 32 and the same operation is followed at each of the arms encountered.

Any suitable means may be employed to control the flow of fluid under pressure into the pipe 36 to retract the arms when desired and the control may be either manual or automatic but to simplify the operation of the drawing apparatus, it is desirable that the arms be retracted simultaneously with the initiation of the return movement of the grip bit carriage. A control system for effecting this mode of operation is shown in Figure 5 wherein reference numeral 37 indicates a motor for driving the carriage return cable. Although in general practice and as shown more fully in my copending application Ser. No. 226,477, filed August 24, 1938, now Patent No. 2,404,234, granted July 16, 1946, the motor 37 is of the reversing type in order that the carriage may be moved in either direction independently of the draw chain. Figure 5 shows only that portion of the circuit which is required to effect return movement of the carriage and the diagram is otherwise incomplete but it is sufficient for the purpose of illustrating the preferred mode of operation of the arms 12. A valve 38, when operated by solenoid 39, is operative to connect supply line 40 with the pipe 36 and when the solenoid is de-energized, the line 40 is closed and the pipe 36 is connected with an exhaust or return line 41.

Motor 37 is energized from the current source L1, L2 through the contactors S1, S2 operated by coil 42. S3 is a limit switch which is opened by an operator 43 on the carriage 11 when the carriage reaches the end of its return movement. S4 is a manually engageable switch which is operative when closed to energize coil 42 through L2, conductor 44, S4, conductor 45, conductor 46 and L1. 47 is a manually engageable inch return button which, when depressed, opens normally closed switches S5 and S6 and closes normally open switch S7. Simultaneously with energization of coil 42 by the closing of switch S4, solenoid 39 is energized through L1, conductor 48, conductor 49, S5, conductor 50, S6, conductor 51, S3, conductor 52, S2, and line L2.

It should be observed that upon the closing of S4, a holding circuit is provided for coil 42 consisting of L2, S2, 52, S3, 51, S6, 45, and 46 to L1. Thus upon closing of S4, solenoids 39 and 42 remain energized until the carriage reaches the die block and switch S3 is opened. The holding circuit may be interrupted at any time by manually depressing the inch control 47. It should be observed that when operator 47 is depressed, the solenoid can not be energized since S5 is opened and therefore the arms are not retracted while return movement of the carriage out along the bench is but effected by the inch control. This feature is of advantage in the event that the grip bits slip off the blank and it is desired to return the carriage only a suffi-

cient distance to get a new bite on the blank. The arms in back of the carriage, being in bench spanning positions, support the blank and so aid in reattaching the blank to the carriage.

Figures 6 through 11 illustrate a modified form of unloading arm construction in which the movement of the arm from operative to inoperative positions and vice versa is accomplished by engagement of the grip bit carriage **55** movable along the bench **56**. The arm, indicated by reference numeral **57**, is rotatably mounted by means of a shaft **58** on a bracket **59** having pivotal connection with the bench **56** by means of a horizontally extending pin **60**. This pivotal interconnection between bracket **59** and bench **56** allows arm **57** to rotate downwardly into engagement with the bench **56** to absorb a heavy load placed on the arm.

The side of arm **57** which is engaged by carriage **55** during its return movement is bowed outwardly at **61** and this portion is arranged to be engaged by a bumper block **62** hinged to carriage **55** at **63** and springs **64** take up the shock of the engagement between **61** and **62**. Integral with or rigidly attached to the arm **57** is a leg **65** which, when the arm is rotated by the member **62**, moves into engagement with a member **66** pivotally mounted on the carriage **55** at **67**. A shock absorbing spring **68** biases the member **66** to outer position and in operation, as the carriage advances into engagement with the arm **57**, the first movement imparted to the arm by the impact is absorbed by member **66** and spring **68** and the reaction of the latter swings the arm back into engagement with member **62** compressing spring **64**. This oscillation may continue for a few cycles thus dissipating the kinetic energy initially imparted to the arm at different points and over a period of time. Consequently none of the parts are subjected to excessive shock and therefore the assembly is less likely to fail in service and will require less maintenance.

Arm **57** is keyed to shaft **58** and keyed to the lower end of shaft **58** is a diametrically extending block **69**, one face of which has alternate engagement with one or the other of the two rubber bumper blocks **70** which are rigidly clamped in the bracket **59**. Extending outwardly of the bracket **59** in a direction parallel with the axis of draw is a boss **71** in which is loosely and rotatably mounted a bent bar **72**. The bar is bent downwardly, as shown, and interconnecting the lower end of the bar and a pin **73** depending downwardly from one end of the member **69** is a tension spring **74** and it should be apparent that the member **69**, swingable rod **72** and coil spring **74** provide an over center device to bias the arm **57** in either its discharging position shown in Figure 6 or in its retracted position along side the bench **56** to which latter position it is moved by the return movement of the carriage **56**. It will be observed that as the arm **57** approaches its outer retracted position, its stopping at such position will be cushioned by one of the blocks **70**.

It should be understood that in a complete drawbench assembly, a number of the arms **57** are spaced along the drawbench and that the direction of draw is as indicated by the arrow in Figure 6. At the start of the outward or drawing movement of carriage **55**, the arms are all in retracted positions and the legs **65** thereof extend generally normal to the axis of draw, these positions being approximately 90° clockwise from the position of leg **65** in Figure 6. As the carriage passes by an arm **57**, the inclined surface **75** of the member **66** engages the leg **65** of the arm and gradually rotates the arm counterclockwise at least sufficient to move the axis of the spring **74** to the other side of the axis of the shaft **58** and the spring **74** is then operative to continue the movement of the arm to its discharging position under the tube, rod, or other object being drawn by the carriage. Upon reaching such position, the movement of the arm is arrested and cushioned in interengagement of the block **69** and the other of the rubber bumper blocks **70**.

It should now be apparent that I have provided improved arrangements and constructions for drawbench discharging arms and for mounting the arms on the bench whereby the arms and their appurtenances are less likely to be damaged during operation of the apparatus and whereby the shocks imparted to the members incident to the normal operation of the aparatus is substantially diminished. Also, it should be now apparent that the invention provides improved methods of operating the arms whereby the general efficiency of the apparatus is increased.

The above specifically described embodiments of the invention should be considered as illustrative only as obviously many changes may be made therein without departing from the spirit or scope of the invention. Reference should therefore be had to the appended claims in determining the scope of the invention.

I claim:

1. Drawing apparatus comprising a drawbench, a grip bit carriage movable thereon, a discharge arm pivotally mounted outside the path of travel of said carriage for rotatable movement into a discharging position in said path, releasable means to retain said arm in retracted position outside of the path of travel of said carriage, and means mounting said arm for rotatable movement in either direction from any position in said path, and means to move said arm into said path from any position out of said path.

2. Drawing apparatus comprising a drawbench, a grip bit carriage movable thereon, a discharge arm pivotally mounted outside the path of travel of said carriage for movement into and out of a discharging position in said path, means constantly urging said arm into discharging position, releasable means to retain said arm out of said path of travel, and means mounting said arm for unlimited rotation in either direction upon release of said releasable means.

3. Drawing apparatus comprising a drawbench, a grip bit carriage movable thereon, a discharge arm movable from a position outside the path of travel of said carriage to a discharging position in said path, releasable means to retain said arm in said first mentioned position, means mounting said arm for movement to said second mentioned position and beyond said second mentioned position sufficient to clear the path of travel of said carriage upon the release of said releasable means, and means constantly urging said arm into discharging position from substantially any position in its path of travel.

4. Drawing apparatus comprising a drawbench, a grip bit carriage movable thereon, a discharge arm pivotally mounted outside the path of travel of said carriage for movement into and out of a discharging position in said path, means constantly urging said arm into discharging position, and means to move said arm into retracted position outside of said path and against the force of said urging means comprising a crank connected with said arm and an arm moving

member connected with said crank, said arm being mounted for unlimited rotation without obstruction by said moving means.

5. Drawing apparatus comprising in combination a drawbench, a grip bit carriage movable outwardly therealong to effect a draw, means comprising a manually engageable control element operable, when actuated, to automatically return the carriage to the work head of the drawing apparatus and a second manually engageable control element operative, when depressed, to effect return movement of said carriage, a discharge arm movable from a retracted position outside of the path of travel of said carriage into and out of a discharging position in said path, means to move said arm from discharging position to retracted position, means operable upon actuation of said first mentioned control element to actuate said means to move said arm, and means operable upon actuation of said second mentioned control element to exclude actuation of said means to move said arm.

6. A drawing machine comprising a drawbench, a grip bit carriage and a discharge arm movable from discharging position in the path of travel of the carriage to a retracted position outside of said path by travel by passage of said carriage, and means on the carriage for resiliently restraining the motion of the arm.

7. A drawing machine comprising a drawbench, a grip bit carriage movable therealong, a discharge arm movable from a discharging position in the path of travel of said carriage to a retracted position outside of said path of travel, means resiliently initiating movement of said arm by passage of the carriage, and means associated with the carriage for resiliently retarding the movement of the arm imparted by said initiating means.

8. Drawing apparatus comprising a drawbench and a grip bit carriage movable therealong, a discharge arm pivotally mounted outside the path of travel of said carriage and movable from a retracted position outside of said path into and out of a discharging position in said path, said arm being engageable by said carriage for movement into retracted position, and yieldable means opposing continued movement of said arm beyond said retracted position, said yieldable means tending to retain said arm in retracted position.

9. In metal drawing apparatus having a workhead, a bench, and a drawhead movable along said bench; a work dicharging device comprising an arm movably mounted on one side of said bench for movement from retracted latched position outside the path of travel of said head to discharging position in said path and vice versa, means to move said arm from discharging to retracted latched position, said means including means to restrain overtravel of said arm and to return said arm from overtraveled position substantially to latched position.

WALLACE E. KERR.

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