Jan. 6, 1948. N. H. NYE ET AL 2,434,006

DRAW BENCH CARRIAGE

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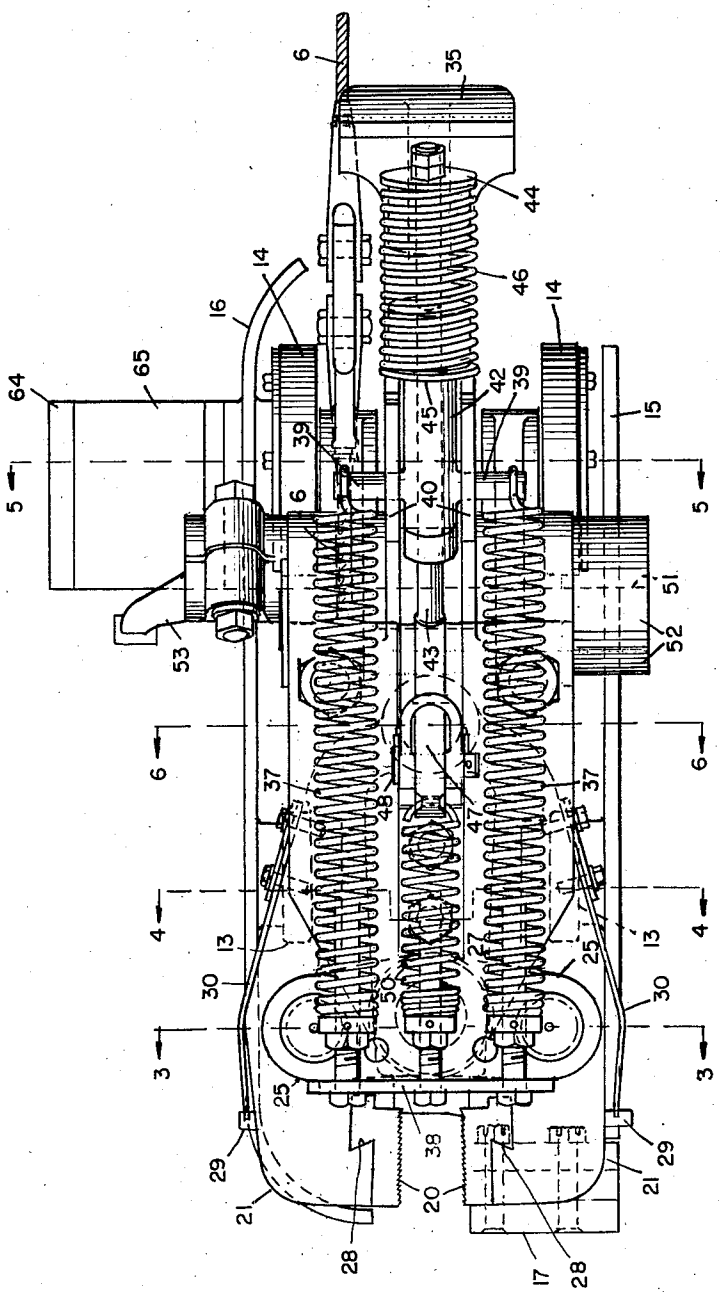


Fig. 1.

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DRAW BENCH CARRIAGE

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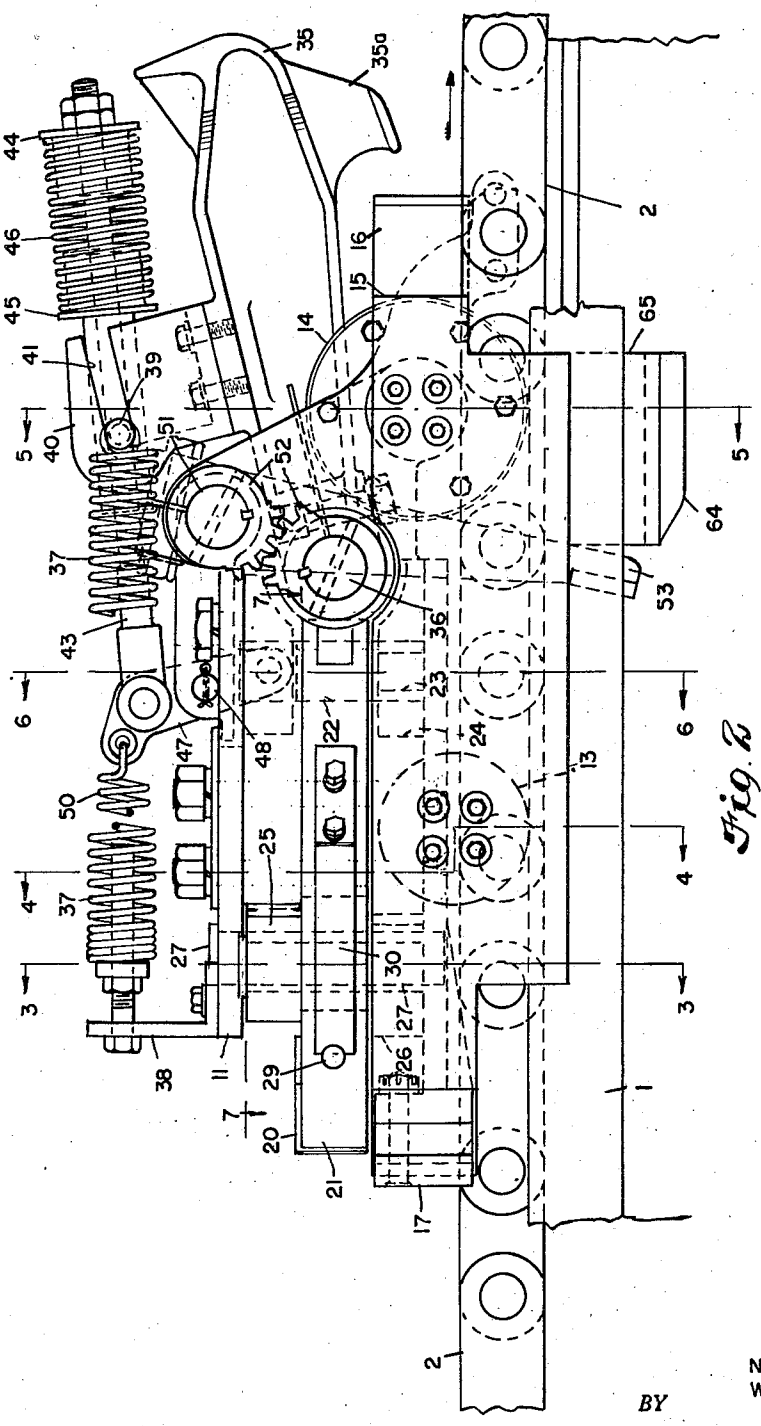


Fig. 2

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DRAW BENCH CARRIAGE

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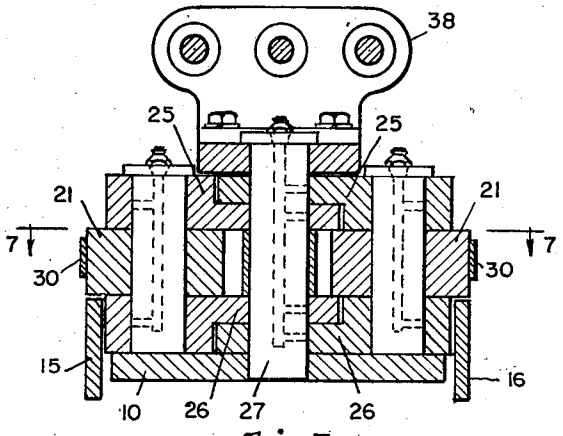


Fig. 3.

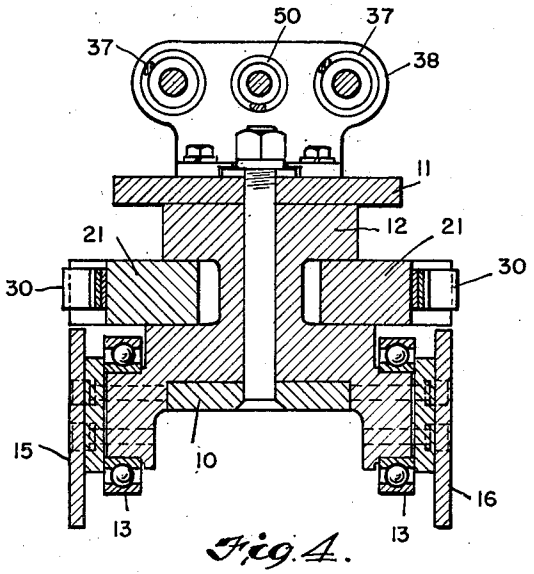


Fig. 4.

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DRAW BENCH CARRIAGE

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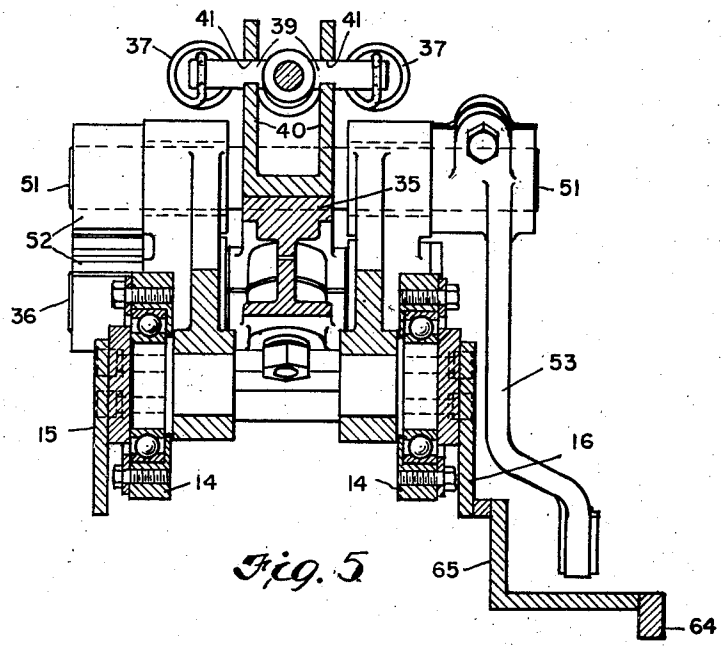


Fig. 5

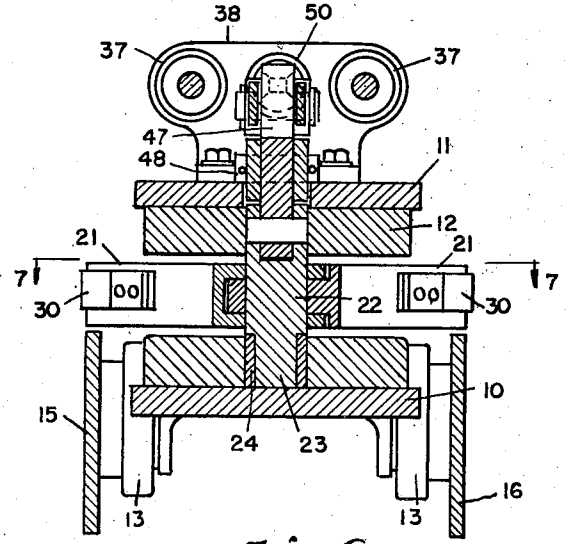


Fig. 6.

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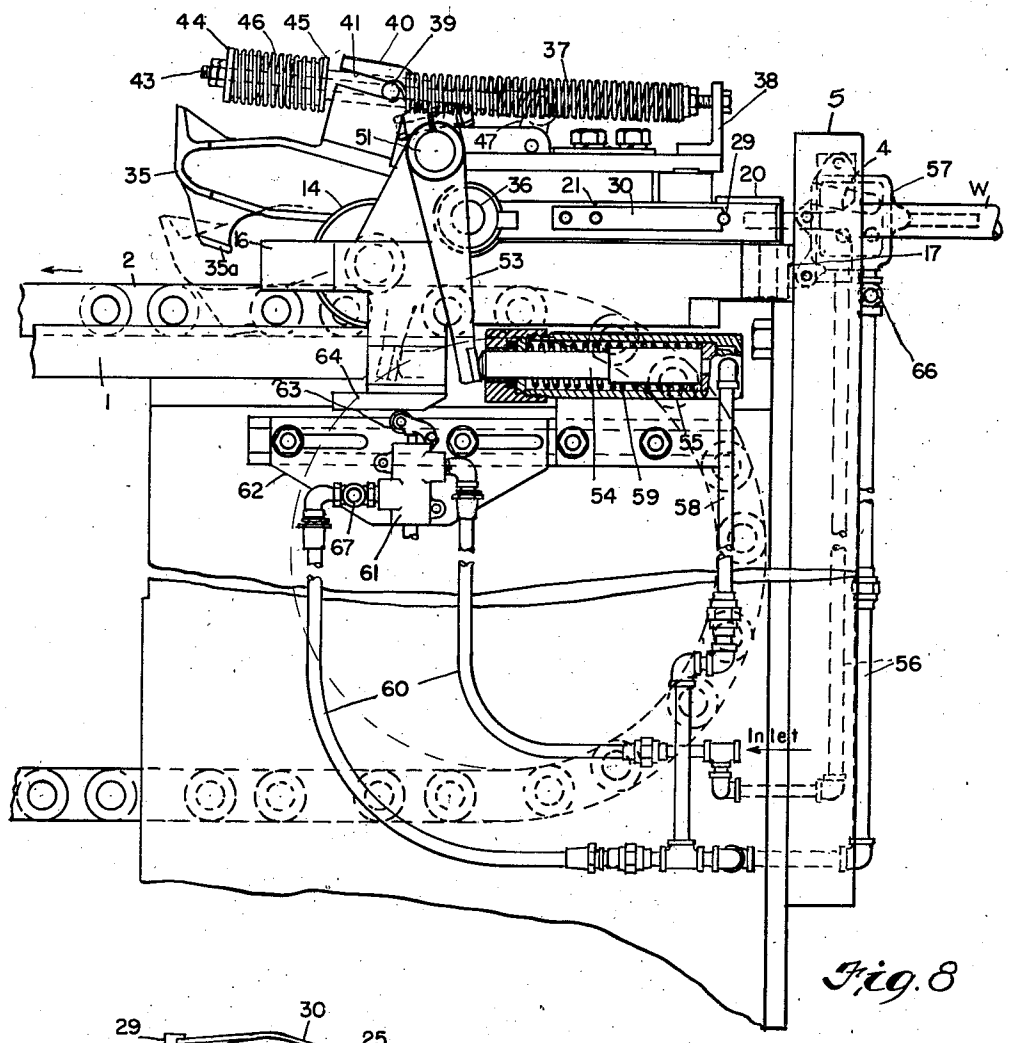


Fig. 8

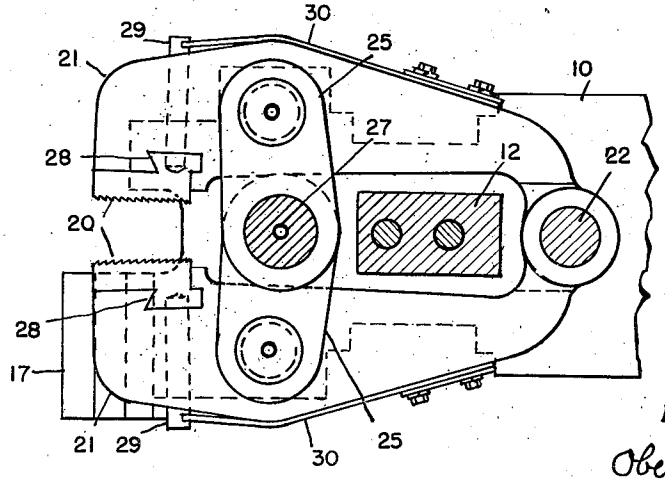


Fig. 7.

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Patented Jan. 6, 1948 2,434,006

UNITED STATES PATENT OFFICE

2,434,006

DRAWBENCH CARRIAGE

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Application January 31, 1944, Serial No. 520,462

6 Claims. (Cl. 205—22)

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While the present improvements relate, as indicated, to carriages for draw-benches, they are generally applicable for use in movable work-piece gripping mechanism for a draw-bench or like machine.

Particularly where employed for drawing tubular work-pieces through a die, as in the familiar type of draw-bench, the work-piece gripping mechanism comprises a carriage adapted to be attached during the drawing operation to a movable chain or like pulling device and then upon completion of the operation to be returned to the starting point, e. g. head block, in which the die is located.

One principal object of the present invention is to provide such a carriage with improved means for thus attaching the same, when required, to the chain which provides the necessary draft. Another object is to provide improved work-piece gripping means and to so interconnect the same with the hook or like element whereby the carriage is thus pulled so that such gripping means will be automatically actuated to seize the end of the work-piece and to release the same at proper times. A still further object is to provide a simple compact mechanism in which the various operative parts are readily accessible so that those which require repair or renewal may be easily removed or replaced.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

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

In said annexed drawings:

Fig. 1 is a plan view of our improved drawbench carriage with certain associated parts of the draw-bench proper;

Fig. 2 is a side elevation of the same;

Figs. 3, 4, 5 and 6 are vertical transverse sections of such mechanism taken on the planes indicated by the lines 3—3, 4—4, 5—5 and 6—6 respectively on Figs. 1 and 2;

Fig. 7 is a horizontal transverse section of a portion of the mechanism showing certain operative parts in plan, the plane of the section being indicated by the line 7—7 Figs. 2, 3 and 6; and

Fig. 8 is a side elevation of the end of the draw-bench adjacent the head block with our improved gripping mechanism occupying one

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operative position in connection therewith, such figure also illustrating more or less diagrammatically certain associated mechanism which controls such operation.

The draw-bench proper wherewith our improved gripping mechanism or carriage is designed to be used will be in general of conventional construction and only certain parts thereof accordingly are shown on the drawings. These (see Figs. 1, 2 and 8) comprise horizontal parallel trackways 1 upon which such carriage is adapted to travel, and, disposed along such track-way, one run of a continuous chain 2 to which the carriage is designed to be attached when drawing a tube W or equivalent work-piece through a die 4 located in head block 5. As will be understood, the end of the work-piece requires to be reduced, or pinched in the case of a tube, so that it may project through the die far enough to be engaged by the gripping mechanism of the carriage. Since the chain 2 is ordinarily employed only when pulling the work-piece, the direction of such pull being to the left as illustrated in Fig. 8, other means such as an endless cable are provided for the return movement of the carriage. It has been deemed unnecessary to illustrate more than the ends 6 of such cable where they are attached to the carriage (see Fig. 1), and the driving means for both such cable and the chain, which are not shown, may be of any usual construction.

The main body or frame of the carriage on which the various operative parts thereof are mounted, comprises plates 10 and 11 which, together with one or more intermediate spacing members 12, are firmly bolted together, as best shown in Fig. 4. To opposite sides of such frame are suitably attached two pairs of wheels 13 and 14 which support the carriage on the trackway formed by rails 1, the forward wheels 14 being preferably somewhat larger than the rear wheels 13, as shown in Fig. 2. The lower portion of the frame is laterally enclosed by side plates 15 and 16, and there is also provided, adjacent the rear end of such plate 15, a buffer block 17 which is adapted to contact with the head block 5 when the carriage is brought to its starting position, i. e. at the beginning of a draw.

The gripping means proper comprise two opposed grip-bits 20 detachably mounted in the outer ends of a pair of complementary, parallel disposed arms 21 located in the rear end of the carriage. These arms are pivotally connected at their inner ends about a common vertical axis formed by a pin 22. The latter (see Figs. 2 and 6) has its lower end 23 flattened on opposite sides

whereby it is held in a short longitudinally extending slot 24 in the carriage frame. Said pivot pin is accordingly capable of corresponding shiftable movement longitudinally of the carriage, thereby likewise shifting such arms and grip-bits longitudinally of the carriage (see Fig. 7), such action being operative to open and close such bits as explained below.

Two pairs of similar links 25, 25 and 26, 26 (see Figs. 3 and 7) are pivotally connected about a common vertical axis formed by pin 27 located to the rear of and aligned with pin 22, the outer ends of said links being respectively pivotally attached to the arms 21 at points intermediate of the ends of the latter. In other words, the linkage just described is located between the inner pivotally connected ends of said arms and their outer ends to which the grip-bits 20 are attached. It will accordingly be seen that upon shifting the position of pin 22 in slot 24 to the left as viewed in Figs. 1 and 7, the pairs of links 25, 25 and 26, 26 will be rocked about pin 27 and thereby cause the jaws 20 to approach each other while upon opposite shifting movement of pin 22 said grip-bits or jaws will be drawn apart. As will be presently described, the pin 22 is operatively connected with the hook whereby the carriage is attached to chain 2 during the drawing operation.

As previously indicated, the grip-bits 20 are detachably secured to the outer ends of arms 21. To this end the latter are formed with dove-tail recesses 28 in which complementary portions of the bits are removably seated. In order to lock the latter in place a transversely movable plunger 29 is provided in the outer end of each arm 21, such plunger being normally pressed inwardly by a flat spring 30 attached to the outer face of the arm. When thus held in its innermost position, the end of the plunger is designed to project into the recess in which the corresponding grip-bit 20 is seated and enter an aperture 20*a* in the rear face of the bit. The latter is thus securely locked in place; however, by drawing spring 30 outwardly, it may be instantly released and left free for removal from its seat.

The hook member 35, whereby the carriage is attached to chain 2 during the drawing operation, will desirably be of the general form shown in Figs. 2 and 8, and is mounted for oscillatory movement in a vertical plane about a transverse shaft 36 journalled in the carriage immediately to the rear of the forward wheels 14, which, together with wheels 13, movably support the carriage on track 1. As shown in Figs. 2 and 8, said hooked member is in its raised position, i. e. disengaged from chain 2, but upon being swung downwardly the hook 35*a* thereon will be positioned to engage with the chain which will be continuously moving in the direction indicated by the arrows on the figures last referred to.

Normally hook member 35 is held out of engagement with the chain, i. e. in the position illustrated in Figs. 2 and 8, by the action of a pair of springs 37, 37 mounted on top of the carriage. Each of these springs is fixedly attached at its one end to a bracket 38 that rises above frame member 11 of the carriage at the end of the latter in which the grip-bits 20 are mounted, while the other end of such spring is attached to the corresponding end of a cross-head 39 (see Fig. 5) that is mounted in a double bracket 40 attached to the upper side of hook member 35 at a point lying beyond its pivotal axis as defined by shaft 36. For convenience in assembling spring 37 and other parts associated with hook member 35, such cross-head 39 is received in rearwardly opening slots 41 in the walls of bracket 40.

The central portion of cross-head 39 is enlarged, taking the form of a cylinder 42 that lies between the walls of bracket 40 and is provided with a bore to receive and guide a rod 43 (see Figs. 1 and 5). Between a seat 44 adjustably secured to the outer end of rod 43 and a complementary seat 45 is mounted a compression spring 46 which tends to draw rod 43 forwardly, i. e. to the right as viewed in Figs. 1 and 2. The opposite or rearwardly extending end of rod 43 is pivotally connected to the upper end of a double arm lever 47 which is oscillatorily mounted in the carriage about a transverse axis 48 and is pivotally connected at its lower end with pin 22 by shifting movement of which the arms 21 that carry the grip-bits 20 are actuated, as previously described.

From the foregoing construction it will be seen that whenever hook member 35 is depressed against tension springs 37, said lever 47 will at the same time be rocked through the medium of rod 43 and the spring 46 to move the outer ends of arms 21, wherein grip-bits 20 are mounted, towards each other and as the latter engage the work said spring 46 will be put under compression.

Also connected with the upper end of the double arm lever or rocket 47 is one end of a tension spring 50, the other end of which is fixedly attached to the same bracket 38 at the rear end of the carriage to which the ends of springs 37 are attached. The action of this spring is both supplemental to and independent of that of the compression spring 46 which, as above explained, acts on said rocker 47 through the rod 43. More particularly, the operative effect secured through action of spring 50 occurs when the hook member 35 in raised position, viz. the rocker is urged in a counterclockwise direction as viewed in Fig. 2, so as to shift pin 22 to the right and thereby cause the outer ends of arms 21 to open so as to insure release of the grip-bits from engagement with the work-piece.

Journalled in the carriage directly above the shaft 36 which carries hook member 35 is a second shaft 51, the two shafts being intergeared through the medium of two intermeshing mutilated pinions 52 on adjacent ends. Mounted on the opposite end of shaft 51 to that which is thus operatively connected with shaft 36 is a depending lever arm 53 the lower end of which lies in the plane of the trackway 1 and is adapted to be engaged by an actuating plunger 54 reciprocably mounted in a cylinder 55 disposed alongside said trackway adjacent the head block or post 5 (see Fig. 8). The disposition of this plunger is such that when the buffer plate 17 on the carriage is brought into contact with said post or block, the lower end of lever 53 will contact with said plunger when the latter is retracted in the cylinder, and upon the plunger being forced outwardly said lever will be rocked and through gears 52 will swing the hook member 35 downwardly in position to be engaged by chain 2.

Actuation of plunger 54 thus to swing lever 53 may be accomplished by either manual or automatic control of pressure fluid supplied to cylinder 55 through the following connections. From the inlet point for such fluid, e. g. compressed air, (such point being so marked on Fig. 8) one line of piping 56 with a manually controlled valve 57 included therein is connected

through line 58 with said cylinder to the rear of plunger 54, it being noted that a spring 59 associated with the plunger normally holds the same in retracted position. Another line 60 of piping leads from inlet through a 3-way valve 61 to said line 58, said valve 61 being designed for automatic operation by the carriage as it approaches the end of its movement toward the head block or post. The connections 60 are preferably flexible so as to permit said valve 61 to be mounted on a plate or bracket 62 that is supported for limited longitudinal adjustment below trackway 1 adjacent the plunger 54. A roller equipped rocker 63 for operating valve 61 projects in the path of travel of a cam 64 carried by an arm 65 depending from the side plate 16 which forms part of the carriage (see Figs. 5 and 8). In addition to the manually operable valve 57 a cock 66 is included in line 56 and similarly in addition to valve 61 a cock 67 is included in line 60, whereby either of said lines may be cut off when it is desired to use the other.

The operation of the several component parts of our improved carriage having been described incidentally to the description of their construction, the general mode of operation will now be briefly indicated with particular reference to the pressure fluid control apparatus last referred to. It will be understood that when the carriage is brought, by means of cable 6, to starting position, as illustrated in Fig. 8, the end of the work-piece which is to be secured thereto will extend through the die in position to lie between the grip-bits 20, which at this stage of the operation will be held open by the action of spring 50. At the same time, of course, the hook member 35 will be held in raised position by the action of springs 37. If now the manually operable valve 57 is to be used, the automatic valve 61 will be cut out and upon operating said valve 57 to supply pressure fluid to cylinder 59, plunger 54 will be actuated to swing lever 53 so as to depress hook member 35 into its chain-engaging position. Incidentally to such depression of the hook member the arms which carry the grip-bits will be actuated to close the latter on the end of the work-piece so that as a carriage is drawn by the chain away from the head block or post such work-piece will be drawn through the die. If instead of manually operated valve 57 the automatic valve 61 is employed, the supply of pressure fluid to cylinder 55 will occur upon engagement of the cam 63 with the rocker on said valve, the position of the latter being adjusted so that such engagement will occur at the proper moment. The resulting operative effect on the mechanism of the carriage will be the same as just set forth.

When the drawing operation has proceeded to the point where the tube or equivalent work-piece is drawn entirely through the die, the suddent release of tension upon the carriage results in a forward movement of the work-piece relatively thereto. One effect of this will be to release the hook 35*a* from engagement with the chain so that member 35 may swing upwardly under the influence of springs 37. At the same time the arms 21 which carry the grip-bits 20 are oscillated to open the latter and release the work-piece from engagement thereby.

It will be seen that our improved draw-bench carriage is relatively simple and compact in construction and its operation is at the same time both sensitive and positive. In particular the use of a latch or like device to retain the hook member in its inoperative position is entirely eliminated. Finally, the construction is such as to lend itself readily to either manual or automatic control of the gripping of the work-piece at the starting of the drawing operation.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:

1. In movable work-piece gripping mechanism for a draw-bench or the like, the combination of a carriage, opposed, relatively movable grip-bits on said carriage, a hook member pivotally mounted on said carriage and adapted in one position to connect the latter with a chain or like pulling device, resilient means normally retaining said hook member disconnected from said pulling device, a rocker operatively connected with said grip-bits, and a link including a compression spring connecting said rocker with said hook member.

2. In movable work-piece gripping mechanism for a draw-bench or the like, the combination of a carriage, opposed, relatively movable grip-bits on said carriage, a hook member pivotally mounted on said carriage and adapted in one position to connect the latter with a chain or like pulling device, resilient means tending to disconnect said hook member, a rocker operatively connected with said grip-bits, a link including a compression spring connecting said rocker with said hook member, and a tension spring connected with said rocker in opposition to said compression spring.

3. In movable work-piece gripping mechanism for a draw-bench or the like, the combination of a carriage, opposed, relatively movable grip-bits on said carriage, a hook member pivotally mounted on said carriage and adapted in one position to connect the latter with a chain or like pulling device, a cross-head mounted on said hook member, tension springs attached to said carriage and cross-head tending to disconnect said hook member, a rocker operatively connected with said grip-bits, a rod slidable in said cross-head and connected at one end with said rocker, and a compression spring interposed between said cross-head and the other end of said rod.

4. In movable work-piece gripping mechanism for a draw-bench or the like, the combination of a carriage, opposed, relatively movable grip-bits on said carriage, a hook member pivotally mounted on said carriage and adapted in one position to connect the latter with a chain or like pulling device, a cross-head mounted on said hook member, tension springs attached to said carriage and cross-head tending to disconnect said hook member, a rocker operatively connected with said grip-bits, a rod slidable in said cross-head and connected at one end with said rocker, a compression spring interposed between said cross-head and the other end of said rod, and a tension spring attached at one end to said carriage and at the other end to said rocker.

5. The combination with a draw-bench including a track-way, a chain or like pulling device extending along and a carriage movable on said track-way; of work-piece gripping means on said carriage, a hook member pivotally mounted on said carriage and adapted in one position to engage said pulling device, said hook member being operatively connected with said gripping

means, resilient means tending to disengage said hook member, a lever mounted on said carriage adapted when moved in one direction to engage said hook member, a pressure-fluid actuated device, located alongside said track-way adapted thus to move said lever, a valve controlling supply of pressure-fluid to said device, and an arm on said carriage adapted to engage and actuate said valve.

6. The combination with a draw-bench including a track-way, a chain or like pulling device extending along and a carriage movable on said track-way; of work-piece gripping means on said carriage, a hook member pivotally mounted on said carriage and adapted in one position to engage said pulling device, said hook member being operatively connected with said gripping means, resilient means tending to disengage said hook member, a lever mounted on said carriage adapted when moved in one direction to engage said hook member, a pressure-fluid actuated device, located alongside said track-way adapted thus to move said lever, a valve controlling supply of pressure-fluid to said device, an arm on said carriage adapted to engage and actuate said valve,

and a manually operable valve adapted optionally to control such supply of pressure-fluid.

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