

N. A. JOHNSON.  
 AUTOMATIC DRAW BENCH HEAD.  
 APPLICATION FILED JAN. 18, 1907.

988,348.

Patented Apr. 4, 1911.

3 SHEETS—SHEET 1.

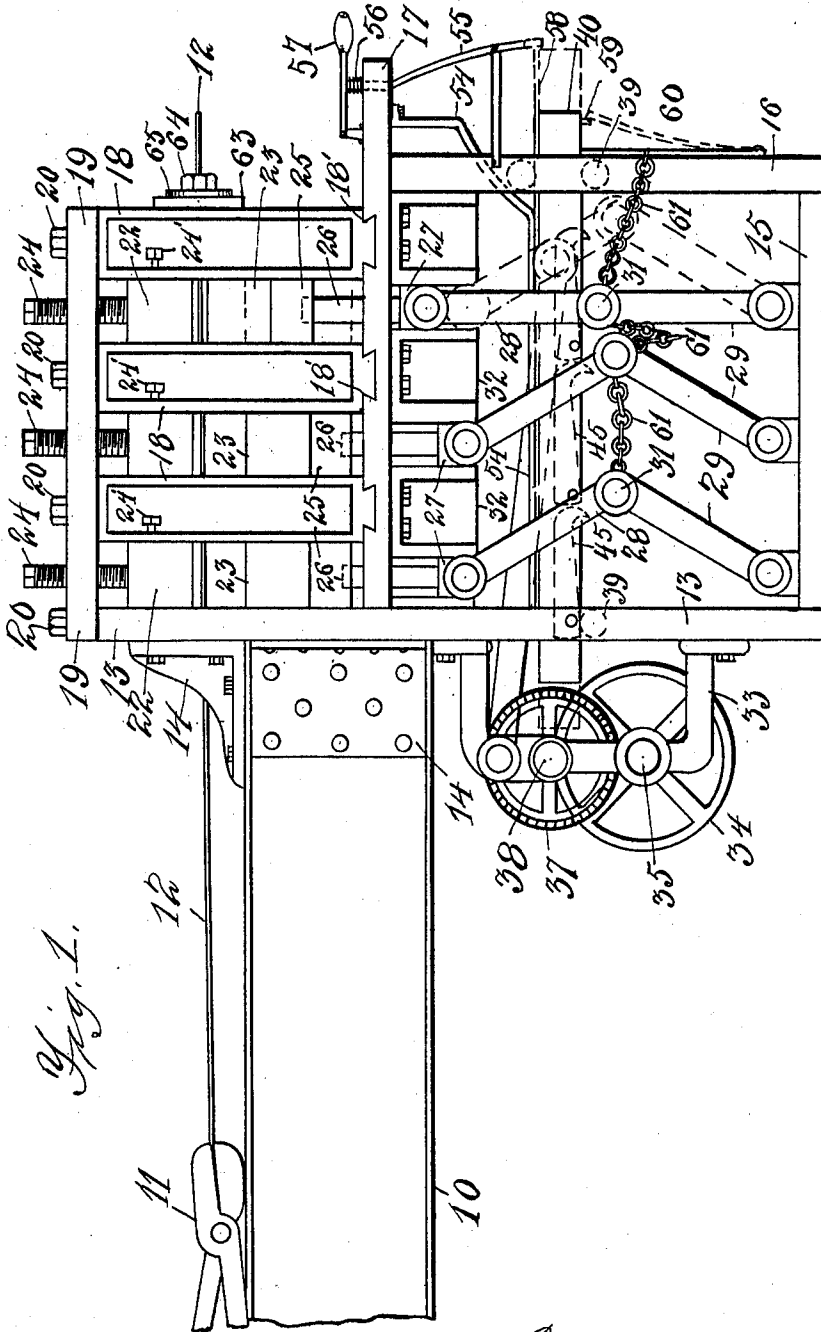


Fig. 1.

Witnesses  
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 J. A. Elsworth.

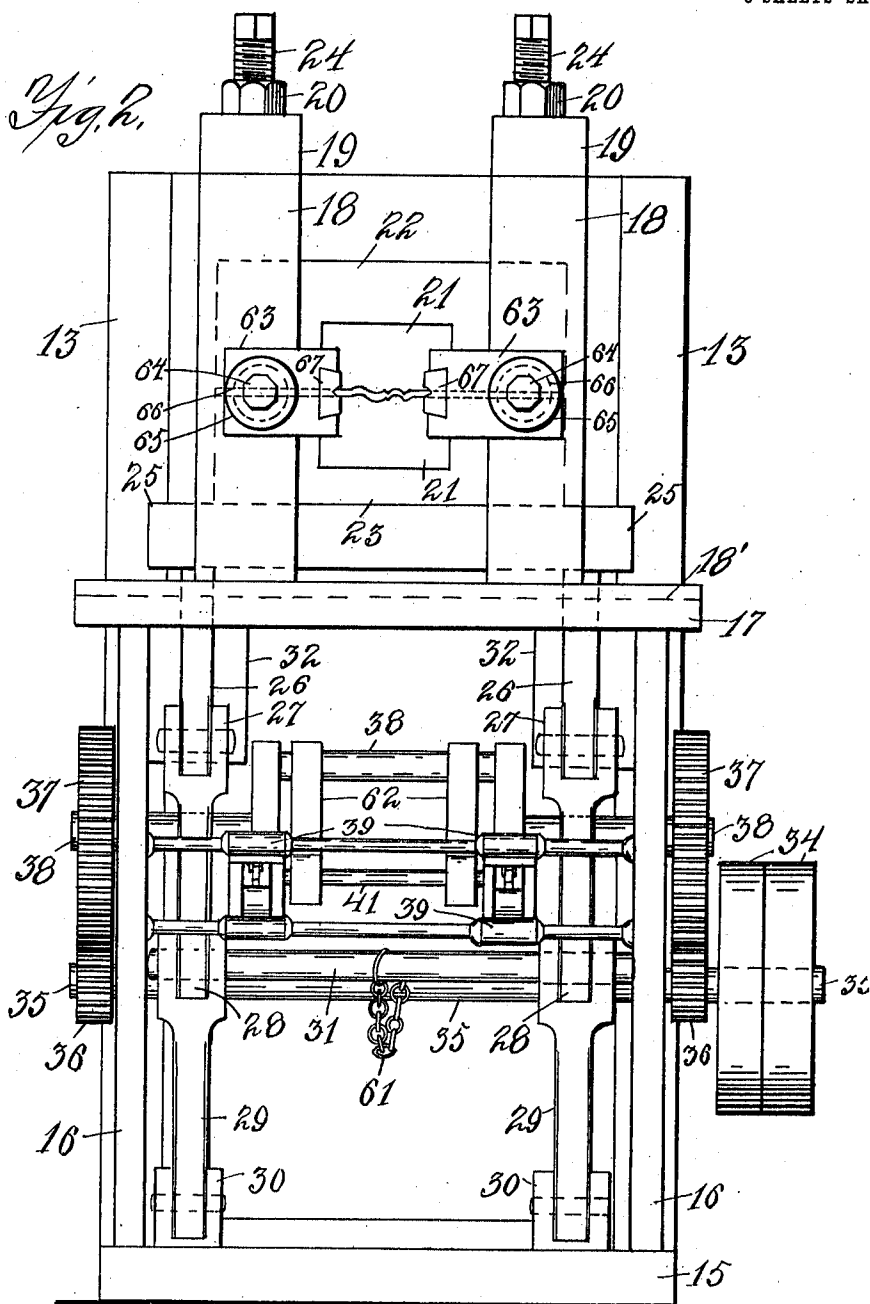
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Witnesses

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*J. C. Elsworth*

By

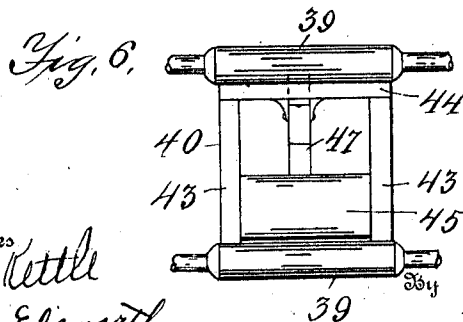
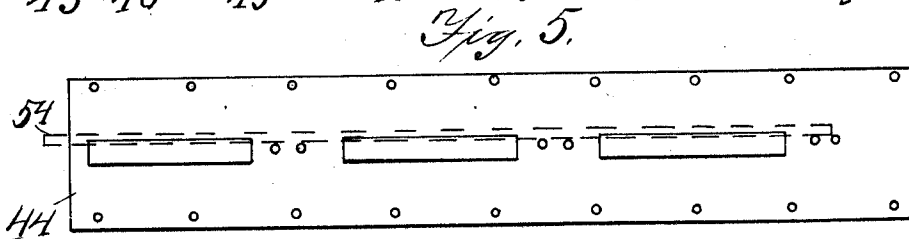
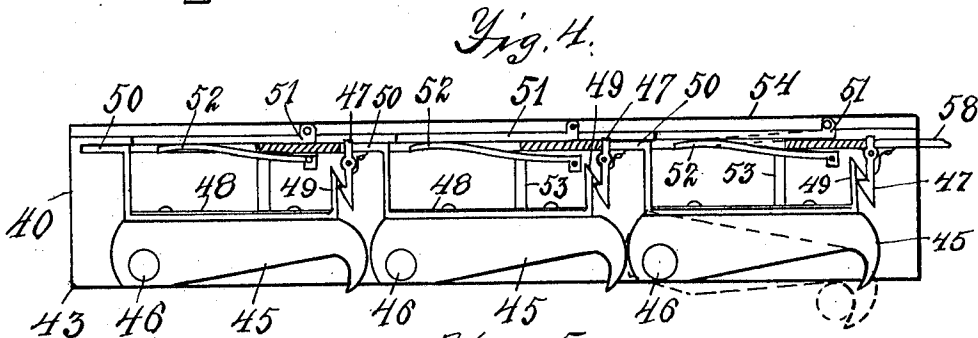
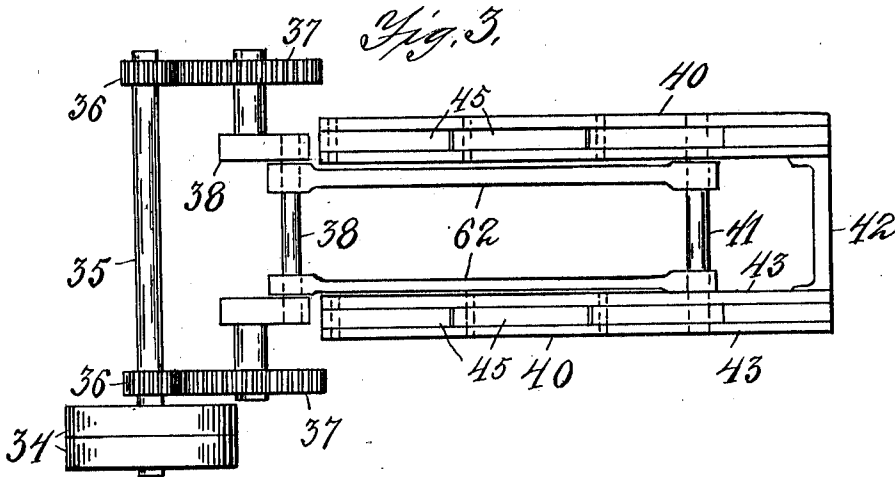
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3 SHEETS-SHEET 3.



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# UNITED STATES PATENT OFFICE.

NELS A. JOHNSON, OF JAMESTOWN, NEW YORK.

AUTOMATIC DRAW-BENCH HEAD.

988,348.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed January 18, 1907. Serial No. 352,970.

*To all whom it may concern:*

Be it known that I, NELS A. JOHNSON, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and State of New York, have invented a new and useful Automatic Draw-Bench Head, of which the following, taken in connection with the accompanying drawing, is a full, clear, and concise description.

The invention relates to improvements in draw benches for drawing metal tubes, rods, moldings, and the like; and the object of my invention is to provide a head for the draw bench having a number of dies which are automatically thrown into contact with the metal as the process proceeds, it only being necessary to first set up or adjust the dies and thereafter they will move into the adjusted position automatically as the metal is drawn through the dies, after starting the machine.

In the drawings, Figure 1 is a side elevation of a draw bench head having a number of dies and means for operating the same. Fig. 2 is a front elevation of the draw bench head showing the dies and means for adjusting and elevating the same. Fig. 3 is a plan view of the draft frame, connecting rods, yoke and gears for operating the toggles. Fig. 4 is a detail side elevation of the draft hooks and pawl mechanism for operating the same. Fig. 5 is a top view of one of the side beams and Fig. 6 is an end view of one of said side-beams of the draft frame with the supporting rollers.

Similar numerals refer to corresponding parts in the several views.

The numeral 10 indicates a portion of a chain beam of a draw bench around which a suitable chain is operated to draw the draw bench tongs 11, which engage the end of the metal strip 12 and draw it through the dies. The frame of the draw bench head is composed of the vertical head plate 13 which is made heavy in order to stand the severe strains put upon it. The beam 10 is attached to head piece 13 by suitable brackets 14. A bed piece 15 is attached to head piece 13 along the floor line and front standards 16 are attached to bed 15 and support the front end of the table 17, the rear end of the table being supported by head piece 13.

The superstructure is an adjustable frame which contains the die blocks, is supported on table 17 and consists of the uprights 18,

which are preferably supported in cross-wise dovetails 18' in table 17 at their lower ends and connected at their upper ends by a cross beam 19 which is attached thereto by suitable machine bolts 20, thus making a structure which can easily be changed and adjusted to accommodate different sized dies. The sectional forming dies 21 are composed of a plurality of sections which are held by the upper die blocks 22 and the lower die blocks 23. The upper die blocks 22 are adjusted in position by screws 24 working in beam 19 and held by set screws 24' working in uprights 18. The lower die blocks 23 are supported upon long pressure bars 25, which are in turn supported on two pressure pins 26 for each set of dies; the length of the pressure bars being as long as the table 17 is wide and regulates the maximum size of the dies. The upper end 27 of toggle arm 28 is pivotally attached to the lower end of pin 26, and the lower toggle arm 29 is pivotally attached within suitable lugs 30 on bed piece 15. A shaft 31 connects the centers of the two oppositely placed toggles, which support both ends of pressure bar 25 and thereby raises and lowers the pressure bar evenly. Guide-blocks 32 are attached to the under side of table 17 to provide vertical ways for the lower end of pressure pin 26.

Gear and pulley supporting brackets 33 are attached to head piece 13 and fast and loose pulleys 34 are supported thereon on a suitable shaft 35. Small gears 36 are also provided on shaft 35 to mesh in large gears 37, which large gears are mounted on shafts on the opposite ends of the crank or yoke 38. The revolution of yoke 38 gives a slow reciprocating movement to draft frame 40 by means of connecting rods 62. Draft frame 40 is supported in the lower portion of the frame by rollers 39 on uprights 16 and head piece 13, which draft frame consists of side beams 40 connected by bar 42 at one end and the cross shaft 41. Side beams 40 each consist of a hollow channel beam composed of the two side pieces 43 and the cap piece 44, the beam 40 being open on its under side so that draft hooks 45 may drop down, which draft hooks are pivotally attached within the hollow beam by suitable cross pins 46.

Suitable catches and pawls are provided for the control of each of the draft hooks 45, which are arranged as follows: A catch

47 is pivotally attached within beam 40 and above the hook end of draft hook 45. A tripper arm 48 is attached to the upper side of draft hook 45, which arm has a catch 5 49 at one end to engage catch 47 and an angular arm 50 at the opposite end to return the hook to normal and also to operate the catch 47 for the next draft hook 45. A pawl 51 is pivotally attached above arm 48 on 10 stationary supporting bar 54 which bar extends horizontally lengthwise above arm 48 and hooks 45. Pawl 51 has a spring 52 to act as a guide to cause pawl 51 to engage arm 50, and thereby raise hook 45 as herein- 15 after set forth. An inwardly projecting pin 53 is provided on arm 48 which arm is attached to the upper side of draft hook 45. Spring 52 is rigidly attached to the draft frame 40 and bears down upon the 20 upper end of pin 53, thereby pressing downward on hook 45. It is placed in this position so that it may perform the double office of guide for pawl 51 and spring for hook 45. The supporting bar 54 is attached 25 to the under side of the table at its front end and to the head piece 13 at its rear end, as shown in Fig. 1, and forms the support for the series of pawls 51.

A bar 55 is attached by a pivotal arm to 30 upright 16 and works in an opening in table 17, and extending above the table has a coil spring 56 to return the same to normal. A lever 57 is hinged to the top of table 17 so as to press downwardly upon pivoted bar 35 55 so as to bring its lower end into the path of the rod 58, which rod 58 is slidably mounted on draft beam 40 and is so guided on said draft beam as to engage the upper end of the first pivotally mounted catch 47 40 and trip or cause to disengage said hook 47 from hook 49 on the upper side of draft hook 45 in starting the operation of the machine. Side beams 40 have an adjustably 45 projected pin 59 on its lower side which engages the upper end of spring bar 60 attached to upright 16. A chain 61 is attached to bar 60 and to cross shaft 31 of the first toggle. The cross shafts 31 of the succeeding toggles are connected to the cross shaft 50 of the first toggle by chains 61 so as to draw the toggles and their supported die blocks from the upper to the lower position. Opposite the opening between the dies and attached to the front uprights 18 at each side 55 is a guide for the stock consisting of the holding piece 63 which is adjustably attached to standard 18 by a suitable screw bolt 64, and a washer 65, the opening 66 in the piece 63 being larger than is necessary 60 for bolt 64 and in consequence, holding piece 63 can be adjusted in any direction so as to guide the stock into the opening between the dies 21. A piece of hardened steel 67 is provided in piece 63 at each side of the stock 65 to stand the wear of the stock as it draws

through and guide the same perfectly into the opening of the dies.

The operation of the draw bench is as follows: The stock 12 is inserted through 70 between the dies and one end gripped by the tongs 11. The guides 63 are then adjusted to the edges of the stock and the first set of dies 21 in die blocks 22 and 23 are adjusted so that they have the desired pressure 75 upon the stock in the following manner: The lower die block 23 is raised to its full height by raising toggle levers 29 to the vertical position shown in Fig. 1. The pressure of the upper die block 22 is then adjusted by means of set screws 24 in beam 19 80 until the desired pressure is attained upon stock 12. Die block 22 is then fixed firmly in the adjusted position by means of set screws 24, through the hollow uprights 18, as shown in Fig. 1. It is now apparent that 85 the lower die block 23 with die 21 may be pressed up against and withdrawn from contact with upper die block 22 with its die 21 by means of toggle levers 29 as often as may be desired without changing the 90 position or adjustment of the dies in their relation one to the other. It is also obvious that the succeeding sets of dies may be set up in the same manner as above described 95 for the first set, and that their toggle levers will open and close said dies the same as in the first set. Pulley 34 is then started by a suitable belt, thereby starting the gears 36 and 37 and causing the yoke 38 to revolve, thereby giving a slow reciprocating motion 100 to draft frame 40 by means of connecting rods 62. The dies 21 and die blocks 22 and 23 are thrown into their closed or working position by means of the toggles moving up 105 the lower die blocks 23. This is attained in the following manner: Starting lever 57 is pushed downward, thereby bringing pivoted lever 55 into the path of rod 58, which trips the catch 47 and releases catch 48 on the first draft hook 45. This draft hook is released 110 or tripped just before it starts on its forward stroke and catches the cross shaft 37 of the first toggle drawing it into the vertical position, thus bringing the first set of dies up into the position for drawing the 115 metal. The first draft hook 45 is thus in its lower or dropped position after catch 47 is tripped by rod 58, bar 55, and lever 57, as hereinbefore described. In dropping 120 down, draft hook 45 bears downward also arm 48, pin 53, spring 52 and pawl 51 so that the end of pawl 51 drops down in front of extension 50 of arm 48 on hook 45 so that the return stroke of the reciprocating draft frame 40 causes pawl 51 to be engaged by 125 the extension 50 and thereby raising the first draft hook 45 to its normal position. The movement of the pawl 51 is sufficient to raise draft hook 45 a little above its normal position so that the angular extension of the arm 13

50 trips the upper end of catch 47 of the second draft hook 45 by pressing against said upper end in the same manner that rod 48 was pressed against the upper end of the catch 47 of the first draft hook to trip the same. This second draft hook then repeats the operation of the first draft hook and thereby brings the second set of dies in the working position. The second draft hook is in turn raised by its pawl 51 by the return stroke of the draft frame 40 and the catch 47 for the third draft hook is thereby tripped in a manner corresponding to the tripping of the second catch 47, thereby setting up the third set of dies. After the first draft hook 45 has been tripped and before the return movement of beam 40, the pin 59 may be moved from the position where it can engage spring 60 and returned to said engaging position when it is desired to again set up the first set of dies. It is apparent that any number of sets of dies can thus be linked together and will automatically be set up into drawing position and may be withdrawn therefrom after performing their allotted part.

The speed of the driving mechanism is so adjusted that one cycle of the forward and return stroke of the draft frame by yoke 48 corresponds to the travel of the stock 12 for a little more than the distance between two sets of dies, so that when a place or point on the stock where the first set of dies began to perform its work, comes between the second set of dies, they in turn commence to perform their work in changing the form or size of the metal and so on through all the different sets of dies until the finished product is produced by the last set. All of the dies will remain set up in working position until the entire strip of stock has passed through the dies. The dies may then be opened by lowering pin 59 so that it catches the upper end of spring bar 60 and frame 40 in its reciprocating movement causes bar 60 to draw upon chain 61, thereby simultaneously withdrawing all the toggles from the vertical to the bent position and leaving them ready to be set up one by one as above described. It is preferred that catch 59 be a simple sliding pin under the control of the operator of the machine so that it can be used at any point of the operation when it is desired to withdraw the dies.

The dove-tail 18' in table 17 extends entirely across the table, said table being made of sufficient thickness to allow of such a cut across its upper side. This allows of the sidewise movement of uprights 18 in order to adjust the entire superstructure and particularly uprights 18 to different sizes of dies, a series of threaded holes being provided along the upper edge of plate 13 for bolting beam 19 in the different positions. Pressure bars 25 are made of sufficient length

to allow of the sidewise movement of uprights 18 and still preserve an even pressure on the dies. The pressure is applied on pressure bars 25 near each end by pins 26 as above stated. Pins 26 may enter slightly into pressure bars 25, as shown in dotted line in Fig. 1. Toggles 29 give their utmost pressure at the point needed, since the upper dies are adjusted to such a position that the extreme upward movement of the toggles gives just the right squeeze on the stock 12, the utmost power of the toggles being exerted as the toggles come to the vertical.

Table 17 must be made strong to stand the strain of the adjustment of the screws 24 on the heavy die blocks. Accordingly the pressure of the toggle levers 29 is applied to pressure bars 25 by means of pins 26 which pass up through and are guided by holes in table 17, which fit the pins 26.

It is obvious that the connecting shaft 35 for toggle levers 29 might be dispensed with without departing from my invention, and a separate series of connections provided for the toggle levers at each side. A chain from each of the front toggle levers to withdrawing lever 60 would attain my object of withdrawing toggles though not as simply or with as even and perfect a movement as in the present construction.

I claim as new:—

1. In a draw bench head, a frame, a plurality of sectional dies arranged in the line of the path of the work and mounted on said frame so as to permit of relative movement to and from each other of the different sections of each set, means for maintaining one of said sections of each set of dies in a desired position, means between the frame and the second section of each of said sectional dies adapted to move the second section toward and in operative position with the first mentioned section, and means between said die-actuating means adapted to bring the die sections into working position in consecutive order.

2. The combination in a draw bench, of a frame, a die formed of sections supported by the frame, one of which sections is movable on the frame to and from the remaining sections, and toggle levers, one end of said toggle levers adapted to move the movable die section and the other end of said toggle levers connected to the frame.

3. The combination in a draw bench of a frame, a sectional die in said frame, one of the sections of said die fixedly held in said frame, the second section of said die supported on a pressure bar slidably movable in said frame, toggle levers having one end connected to said pressure bar and the other end connected to said frame, and means for actuating said toggle levers.

4. The combination in a draw bench of a frame, a sectional die in said frame, one of

the sections of said die fixedly held in said frame, the second section of said die supported on a pressure bar slidably movable in said frame, toggle levers having one end 5 connected to said pressure bar and the other end connected to said frame, a draft frame slidably mounted in said frame and reciprocating means therefor, draft hooks in said draft frame, and tripping means for said 10 draft hooks to cause the same to engage said toggle levers and actuating the same.

5. The combination in a draw bench, of a table, a die frame composed of vertical members dove-tailed at their lower ends into 15 said table, a connective crosswise member for the upper ends of said vertical members, a sectional die supported by said vertical members, one of the sections of said die secured in said frame, a pressure bar slidably 20 mounted in said frame between said vertical members, a second section of said die mounted in said frame on said pressure bar to move therewith, and means for moving said pressure bar and second die section to 25 carry said second die section into and out of

coöperative relation with the other die section.

6. The combination in a draw bench of a suitable frame, a series of sectional dies mounted in said frame so as to permit of 30 relative movement to and from each other of the different sections, a series of toggle levers 28 and 29 having one end connected to one of said movable sections and the other end attached to said frame, said toggle levers 35 having central connecting rods 31 and connecting chains 61, a draft frame 40 slidably mounted in said frame and means for actuating the same, and means on said draft frame for consecutively setting up said toggle levers, substantially as and for the purpose specified. 40

In testimony whereof I have signed by name to this specification in the presence of two subscribing witnesses.

NELS A. JOHNSON.

Witnesses:

A. W. KETTLE,

I. A. ELSWORTH.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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