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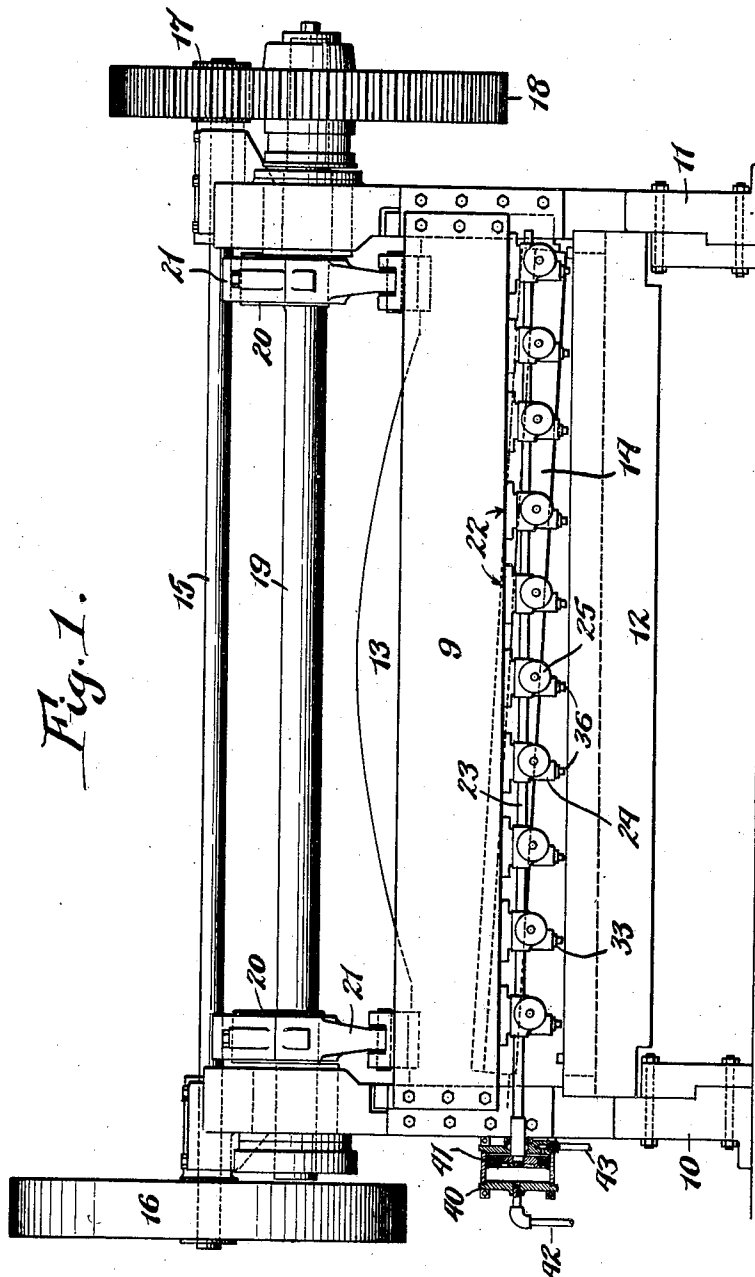
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HOLDDOWN FOR PUNCH PRESSES, SHEARS, OR THE LIKE

Filed April 18, 1932

3 Sheets-Sheet 1



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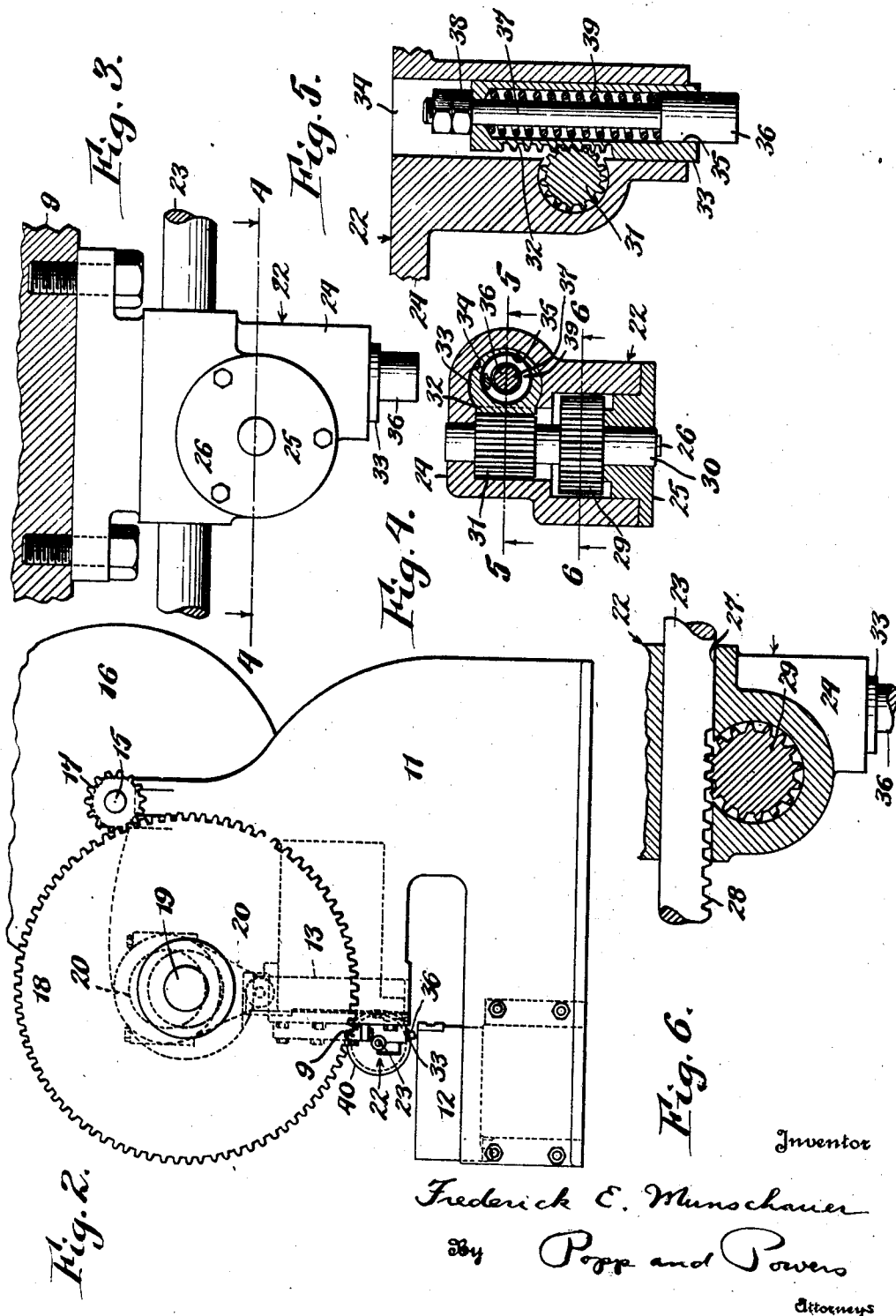
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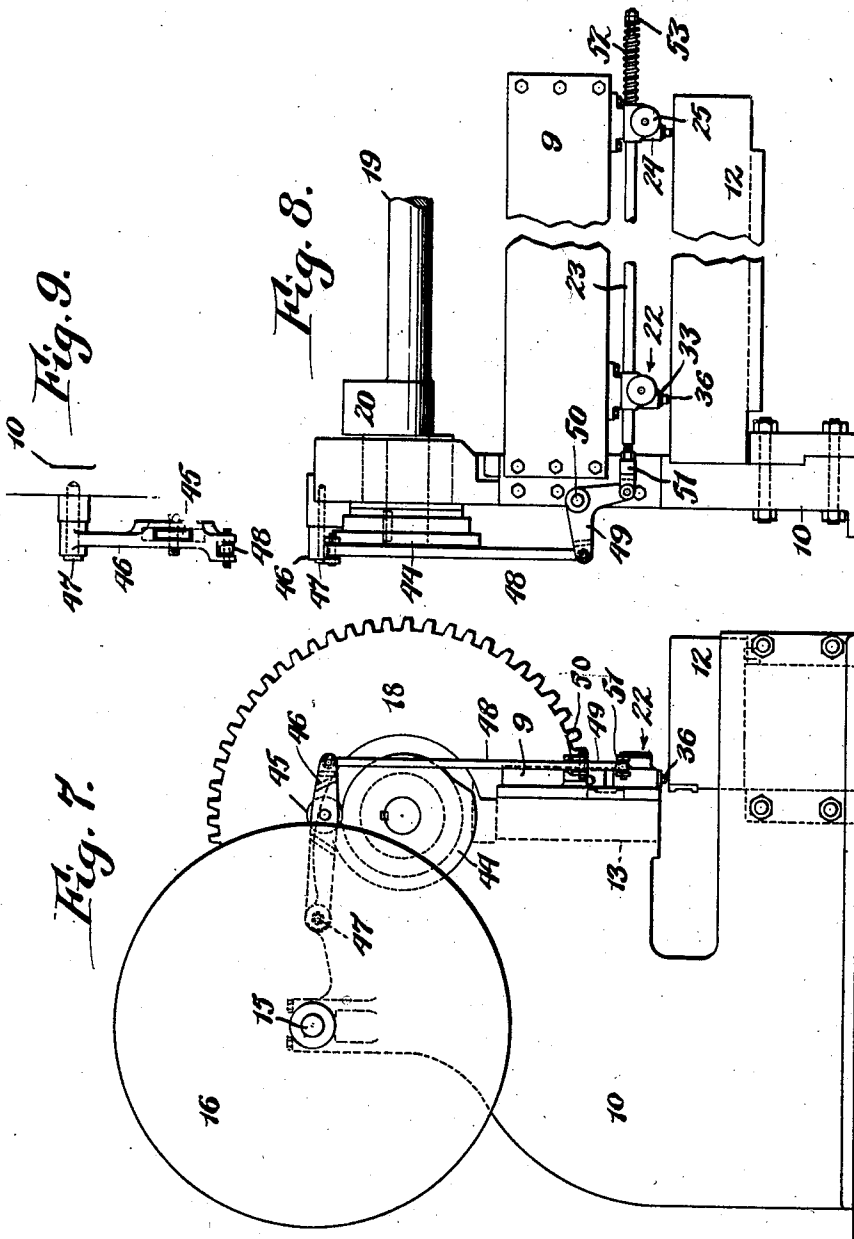
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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HOLDDOWN FOR PUNCH PRESSES, SHEARS, OR THE LIKE

Application filed April 18, 1932. Serial No. 605,983.

This invention relates to a holddown for shearing machines, punch presses or the like, and more particularly to a device for pressing upon a sheet of metal in a punch press at a multiplicity of points during the shearing or stamping operation so that the sheet of metal is held in proper position during the stamping or shearing operation and does not get out of alinement.

One of the principal objects of this invention is to provide such a holddown device which presses upon a sheet of metal in the shears at a multiplicity of places and exerts a uniform pressure at each point regardless of variations in the thickness of the metal or other conditions and at the same time is operable from a single source so that its operation can be controlled from one place.

Another object is to provide such a holddown which can be operated through fluid pressure and at the same time avoids a multiplicity of cylinders with the consequent danger of leakage which has been the disadvantage of such fluid pressure systems heretofore used, the present invention proposing a master cylinder which controls each of the holddown devices through mechanical connections.

Another object is to provide such a holddown which can be readily used in connection with other controls or with an automatic control such as a cam which is synchronized with the operation of the shears.

Another purpose is to provide a multiplicity of spring feet or presser members which are operated in unison and each of which is so designed that it exerts the required pressure to hold the metal in position and at the same time yields so that the other spring feet can be brought down far enough to also engage the sheet of metal with the proper pressure. These spring feet are so designed that they are extremely simple in construction, are compact, are easily operated

and will not get out of order under conditions of severe and constant use.

In the accompanying drawings:

Figure 1 is a front elevation of a power shears showing the same equipped with a holddown device embodying my invention, the holddown feet in this form of the invention being operated from a master cylinder at one end of the machine.

Figure 2 is an end elevation viewed from the right hand end of Fig. 1.

Figure 3 is a side elevation of one of the holddown units of which a multiplicity are shown in Fig. 1.

Figure 4 is a section taken on line 4—4, Fig. 3.

Figures 5 and 6 are sections taken on the correspondingly numbered lines of Fig. 4.

Figure 7 is a side elevation viewed from the left hand side of Fig. 1 and showing a modification of the master control for the holddown units, which master control includes a cam synchronized with the operation of the press.

Figure 8 is a fragmentary view similar to Fig. 1 and showing the modified form of the invention illustrated in Fig. 7.

Figure 9 is a fragmentary top plan view of the form of the invention shown in Fig. 7 and showing the rock arm operated by the cam.

Similar reference numerals refer to similar parts in each of the several views.

The invention is illustrated in connection with a power shears although it will be understood that the invention can be employed anywhere where it is desirable to hold down a piece of metal upon a table while some operation is being performed upon it. The shears shown consist of standards 10 and 11 which support a bed 12, a cross plate 9 and a vertically reciprocating head 13 carrying the knife 14, the sheet of metal, fiber, etc. to be cut being placed upon the bed 12 and being sheared by the knife 14 as the head 13 is re-

reciprocated. The standards 10 and 11 also carry a drive shaft 15 at one end of which is arranged the driving pulley 16 and at the other end a pinion 17 which meshes with a large gear 18. The gear wheel 18 is fast on a cam shaft 19 which is journaled in the standards 10 and 11 and carries a pair of cams 20. These cams are connected by straps 21 with the cutter head 13 so that as the cam shaft 19 turns the cutter head is reciprocated vertically, this cutter head being suitably guided in the end heads 10 and 11 and the cross plate 9.

The present invention consists of a plurality of spring holddown units indicated generally at 22 which are operated in unison through the reciprocation of a rod 23, this rod passing through the casings of each of the units 22 and having one end projecting beyond the end of the standard 10. These units 22 are secured to the underside of the cross plate 9 by screws or in any other suitable manner and each is preferably constructed as follows:

The casing for each of the spring holddown units 22 preferably comprises a body portion 24 and a cap 25 which is secured to one side of the body portion by screws 26 or in any other suitable manner. As best shown in Fig. 6, the rod 23 slides in a slideway 27 provided in the body portions 24 of each casing and is provided at each of the units 22 with a plurality of teeth 28 so that the rod 23 is, in effect, a rack. These teeth are provided adjacent each unit 22 and each group of teeth engages with a pinion 29 which is integral with cross shaft 30, this cross shaft being journaled at one end in the body 24 of the casing and at its other end is journaled in the cap 25. Within the body portion 24 this shaft 30 carries another integral pinion 31 which meshes with teeth 32 provided in the side of a sleeve 33. This sleeve is slidably carried in a vertical slideway 34 in the body portion 24 and is provided with a cylindrical bore 35. In the lower part of this cylindrical bore 35 and projecting downwardly from the lower end of the sleeve 33 is a cylindrical holddown foot 36 which is adapted to engage the metal on the bed 12 of the power shears. Extending up from this holddown foot 36 is a stem 37 which extends upwardly through the sleeve 33 and at its upper end is provided with a nut 38 which limits the downward movement of the holddown foot 36 but permits it to move upwardly. Interposed between the foot 36 and the upper end of the sleeve 33 is a helical compression spring 39, this spring holding the foot 36 in a downward position relative to the sleeve 33 and holding the nut 38 in engagement with the upper end of the sleeve.

It is apparent that upon reciprocating the rod 23 in one direction its teeth 28 turn the pinions 29 and 31 and thereby reciprocate the

sleeve 33 downwardly. This continues until the foot 36 engages the piece of metal, fiber, or other sheet material on the bed 12 after which, if the reciprocation of the rod 23 is continued, the continued movement of the sleeve 33 will operate to compress the spring 39 but will not force the foot 36 further although exerting additional pressure on the foot. With a plurality of units 22 it is therefore apparent that the springs 39 will equalize any differences in their action and will compensate for any inequalities in the surface of the piece of sheet metal being held down since these springs will give and yieldingly hold the feet 36 against the surface of the sheet.

In the form of the invention shown in Fig. 1, the master rod 23 is reciprocated by fluid pressure, this rod extending through one head of a cylinder 40 and being connected with a piston 41 therein. Fluid is admitted to the cylinder 40 on opposite sides of the piston 41 by means of pipes 42 and 43. It is therefore apparent that by suitable manipulation of the valves (not shown) the piston 41 can be reciprocated to move the rod 23 to either press the several holddown feet of the unit 22 into engagement with the sheet of metal on the bed 12 or to withdraw these feet therefrom.

Instead of providing a master cylinder to control the reciprocation of the master rod 23 this can be effected from a cam which is synchronized with the operation of the shear. Such a form of the invention is shown in Figs. 7-9 in which the controlling cam 44 is mounted at one end of the main cam shaft 19 and is engaged by a roller 45, this roller being carried by a rock arm 46. One end of this rock arm 46 is pivoted to the standard 10 as indicated at 47 and the free end is pivotally connected to a connecting rod 48. The lower end of this connecting rod 48 is connected to a bell crank lever 49, this bell crank lever being pivoted at its center to the standard 10 as indicated at 50 and the other arm of this bell crank lever being connected by means of a coupling 51 with the end of the master rod 23. This coupling is preferably such that it can be adjusted so as to vary the distance between the bell crank lever and the rod 23. It is apparent that each time the cam 44 reciprocates, the bell crank lever 49 is moved to reciprocate the holddown feet of the units 22. The constant engagement of the roller 45 with both the salient and low parts of the cam 44 is insured by a compression spring 52 which is interposed between a nut 53 at the free end of the rod 23 and the endmost unit 22 so that this spring constantly urges the rod 23 in the position in which the holddown feet are held in their elevated position while the salient portion of the cam 44 forces these holddown feet against the resistance of the spring 52, down and into en-

gagement with the sheet of metal on the bed
12.

From the foregoing it is apparent that the present invention provides a very simple and durable means for holding a sheet of metal on the bed of a shear or the like at a plurality of places and at the same time permits of all of these holddown units to be released or placed in operation simultaneously from a single controlling source. The holddown also does not interfere with the free operation of the machine, is compact, will not get out of order, and can be easily adapted to either automatic operation in synchronism with the shear or to hand controlled operation.

I claim as my invention:

1. A holddown mechanism for shears or the like, comprising a plurality of holddown feet movably mounted on the shear frame for movement toward and from the bed thereof, a movable bar arranged adjacent said feet, means for moving said bar and means operatively connecting said bar and holddown feet for simultaneously moving each of said feet into and out of operative position.

2. A holddown mechanism for shears or the like, comprising a plurality of holddown feet movably mounted on the shear frame for movement toward and from the bed thereof, a longitudinally reciprocable bar arranged adjacent said feet, means for reciprocating said bar and means operatively connecting said bar and holddown feet for simultaneously moving each of said feet into and out of operative position.

3. A holddown mechanism for shears or the like, comprising a plurality of vertically reciprocable holddown feet mounted on the shear frame for movement toward and from the bed thereof, a movable bar arranged adjacent said feet and means operatively connecting said bar and hold down feet for simultaneously moving each of said feet into and out of operative position.

4. A holddown mechanism for shears or the like, comprising a plurality of casing members mounted on the frame of said shear adjacent the bed thereof, and each of said casings being provided with a slideway, a holddown foot arranged in each of said slideways and movable toward and from the bed of said punch press, a movable bar arranged adjacent said holddown feet, means for moving said bar and means for simultaneously reciprocating each of said holddown feet into and out of operative position through motion derived from said bar.

5. A holddown mechanism for shears or the like, comprising a plurality of carriers each having a recess, a holddown foot slidably arranged in said recess and projecting outwardly therefrom, means limiting the outward movement of said foot, a spring in said recess and urging said foot into its projected position, means for movably supporting

said carrier and means for simultaneously moving each of said carriers to move said feet into and out of operative engagement with the sheet material on the bed of the shear.

6. A holddown mechanism for shears or the like, comprising a plurality of sleeves open at one end, means for supporting said sleeves for longitudinal, vertical, reciprocatory movement, a holddown foot fitted in said sleeve and projecting outwardly therefrom, a stem on said foot and projecting through the end of said sleeve opposite its open end, an abutment at the projecting end of said stem to limit the outward projection of said foot, a spring in said sleeve around said stem and urging said foot to project outwardly and means for simultaneously reciprocating each of said carriers to move said feet into and out of operative engagement with the sheet material on the bed of the shear.

7. A holddown mechanism for shears or the like, comprising a plurality of longitudinally reciprocable holddown feet mounted on the punch press frame for movement toward and from the bed thereof, a movable bar arranged adjacent said feet and means, including a pinion for simultaneously moving each of said feet into and out of operative position.

8. A holddown mechanism for shears or the like, including a plurality of longitudinally movable holddown devices having a row of teeth and arranged to move toward and from the bed thereof, a rack arranged adjacent said members, means for reciprocating said rack and pinion means connecting said rack with the teeth of said devices, whereby said devices are simultaneously moved into and out of operative position on reciprocating said rack.

9. A holddown mechanism for shears or the like, including a plurality of casings, each of said casings being provided with slideways arranged at an angle to one another, a rack extending through the corresponding slideways of each of said casings, pinion means journaled in each of said casings and engaging the corresponding teeth of said rack, and a holddown device arranged in the other slideway of each casing and provided with a row of teeth also engaging pinion means whereby as said rack is reciprocated, said holddown devices are simultaneously moved into and out of operative position.

10. A holddown mechanism for shears or the like, including a plurality of casings, each of said casings being provided with slideways arranged at an angle to one another, a rack extending through the corresponding slideways of each of said casings, pinion means journaled in each of said casings and engaging the corresponding teeth

of said rack, a sleeve having external teeth arranged in the other slideways of each casing, the teeth of said sleeve also engaging said pinion means, a holddown foot arranged in said sleeve and spring means arranged in said sleeve and urging said holddown foot into an outwardly projecting position, the holddown feet associated with the several casings being simultaneously moved into and out of operative position upon reciprocating said rack.

In testimony whereof I hereby affix my signature.

FREDERICK E. MUNSCHAUER.

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