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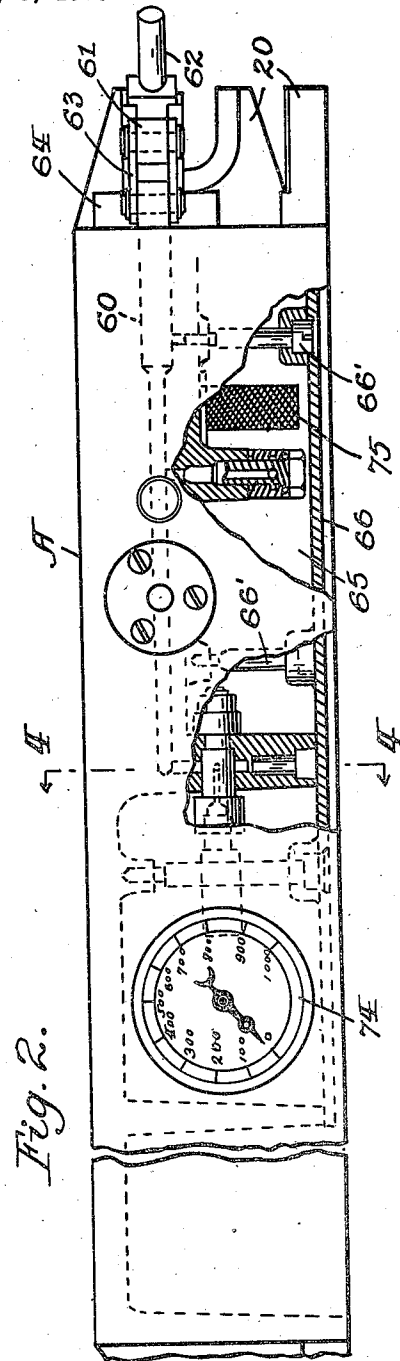
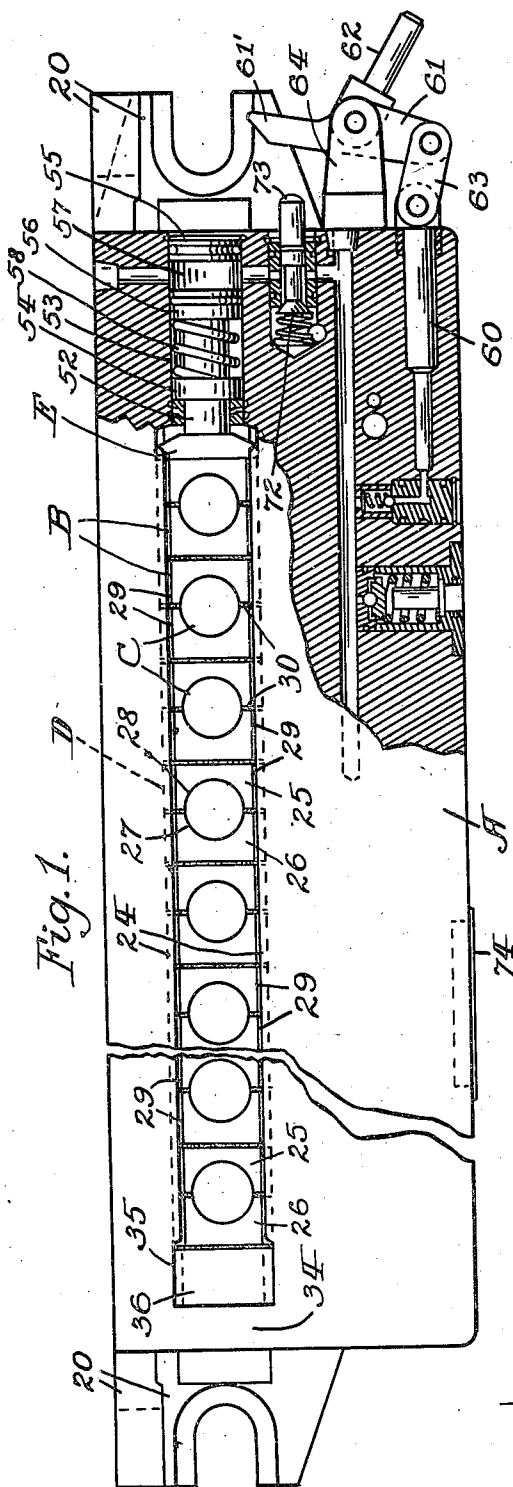
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2,415,520

WORK HOLDER

Filed July 8, 1944

4 Sheets-Sheet 1



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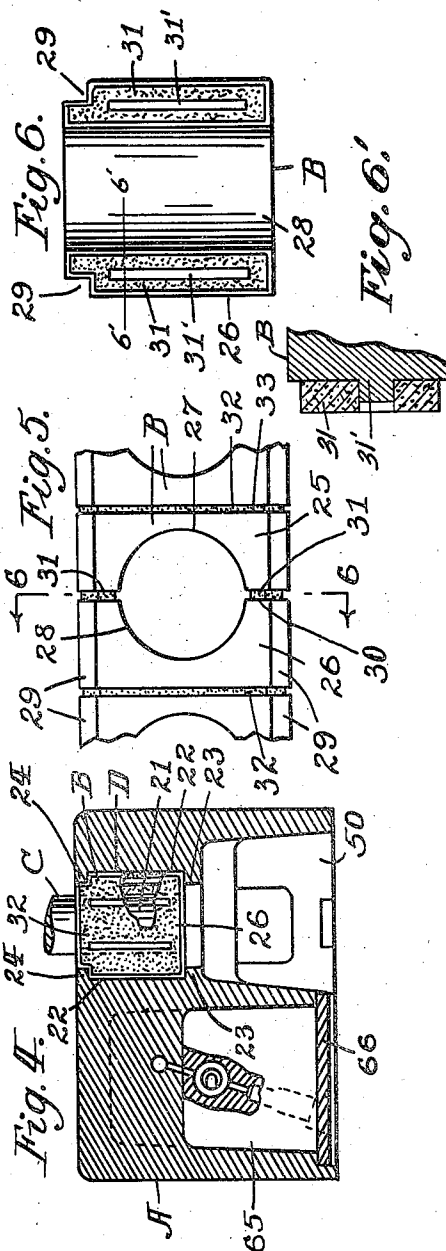
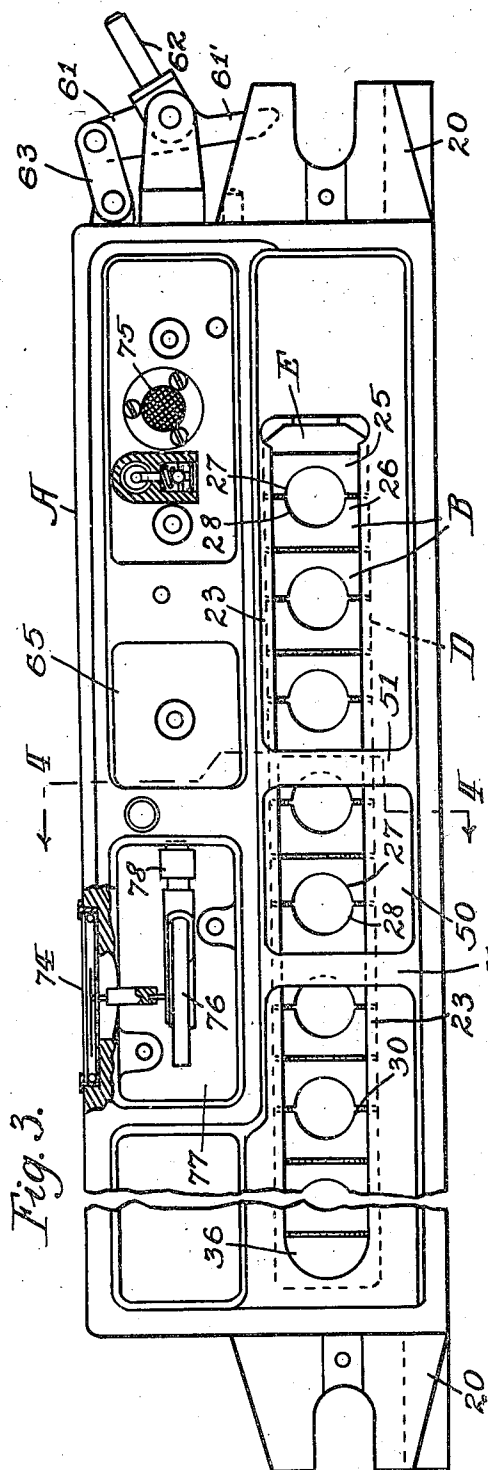
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WORK HOLDER

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4 Sheets-Sheet 2



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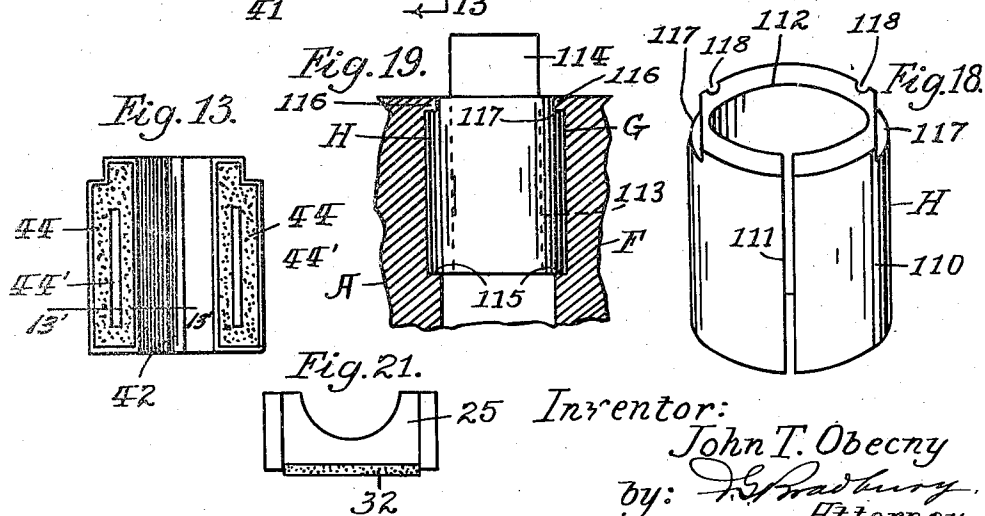
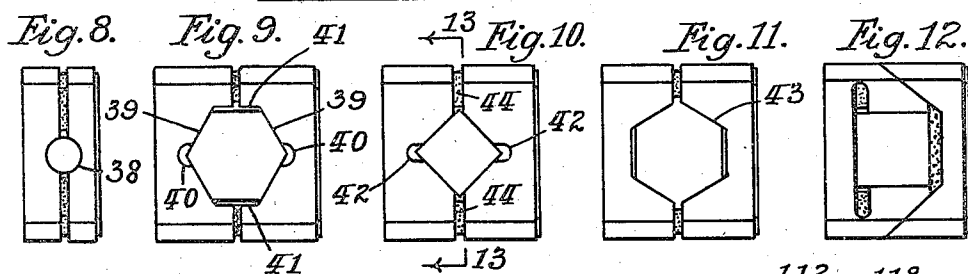
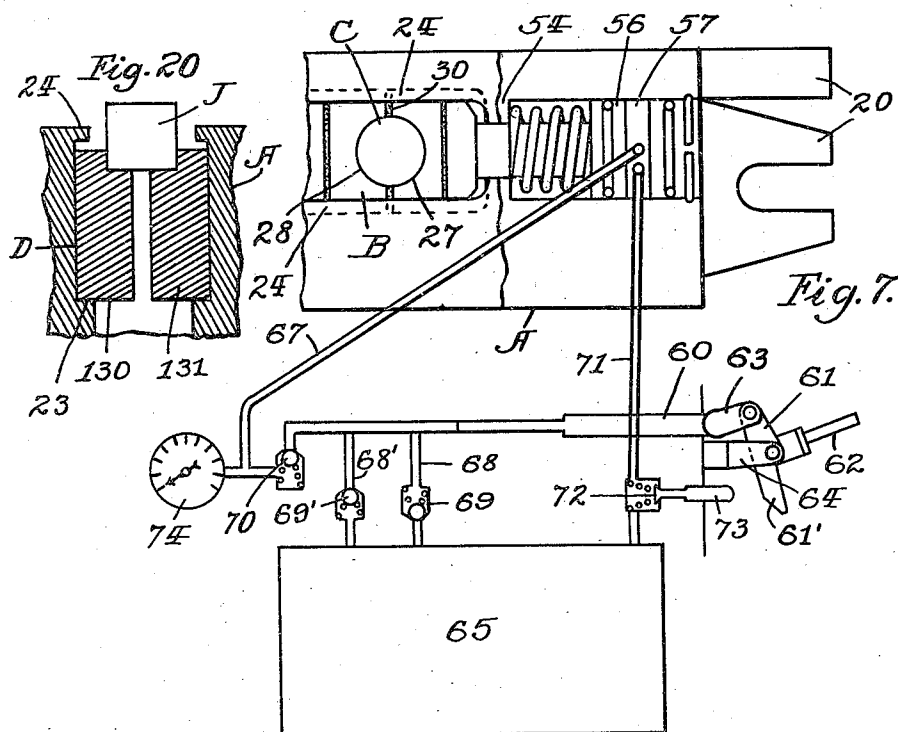
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2,415,520

WORK HOLDER

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4 Sheets-Sheet 3



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2,415,520

WORK HOLDER

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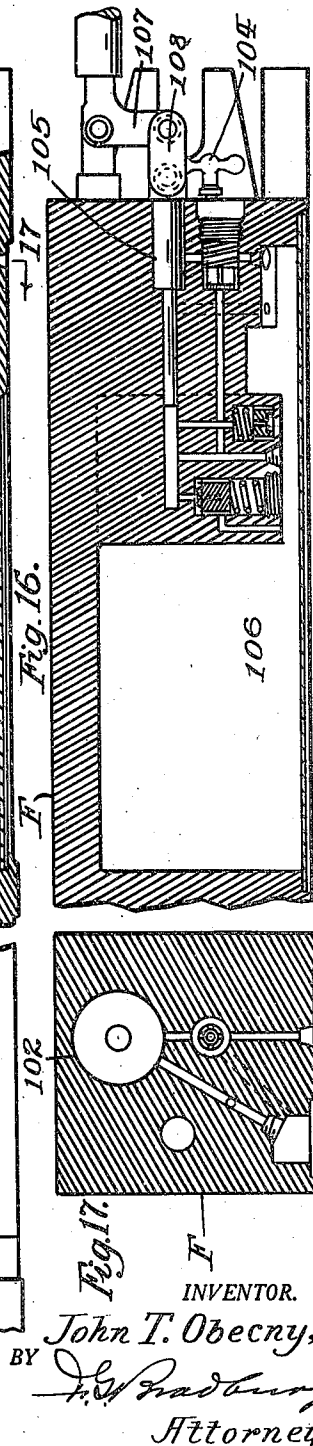
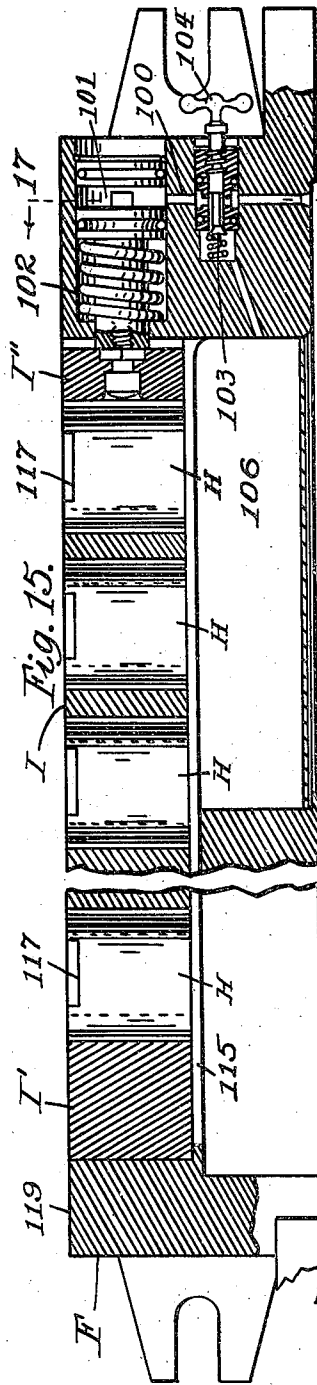
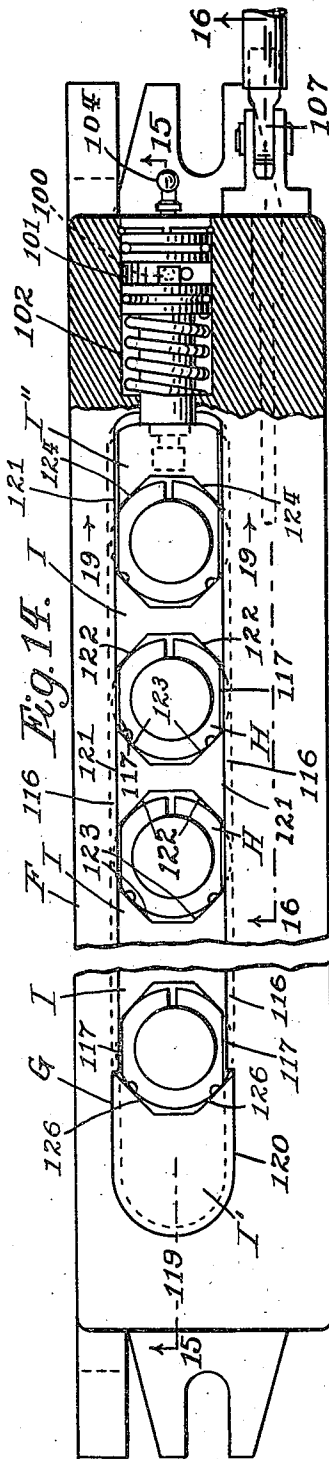


Fig. 17.
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UNITED STATES PATENT OFFICE

2,415,520

WORK HOLDER

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2 Claims. (Cl. 90—59)

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This invention relates to improvements in work holders and more particularly to that type by which a plurality of work pieces are securely held in alinement for fine precision multiple chucking operation in milling machines, shapers, drill presses, grinders and various machine tools. The invention also relates to improvements upon the structure set forth in my companion application, Serial Number 483,501, filed April 17, 1943, and now Patent No. 2,366,979, granted January 9, 1945, of which the present application is a continuation in part. This invention, like in the structure referred to in said companion application is adapted for the multiple production of fine precision work and a number of work pieces are held firmly and evenly by applied pressure, regardless of inequalities, the controlled pressure means being equalized to apply even holding pressure simultaneously upon all of the work pieces. The present invention is simple and is made effective by the use of a single pressure actuator or ram for operating a plurality of work piece clamping chucks in the holder simultaneously, said actuator being operated by single hydraulic, mechanical or other suitable controlled means. One of the primary objects of the present improvement, therefore is simplified and minimum cost of construction, by which a number of work piece holding chucks are operated by evenly distributed force exerted by a single actuating unit so that all of the work pieces are immovably held evenly in aligned position, irrespective of inequalities, while being machined or worked in any manner. Among further objects and advantages are also the saving of time and expense in the multiple production of machined articles and the correct and accurate positioning of work pieces for milling, grinding, cutting or other working.

With the above objects and advantages in view and in addition to objects and advantages not specifically mentioned, my invention comprises the features of construction and combination of parts hereinafter described and claimed.

In the accompanying drawings forming part of this specification, Fig. 1 is a top plan of my improved work holder, part of the structure being broken away and in section; Fig. 2 is a front elevation partly broken away and in section; Fig. 3 is a bottom plan of my invention, part of the structure being broken away and in section, the cover over the reservoir and pressure indicator compartment being removed; Fig. 4 is a section taken on the lines 4—4 of Figs. 2 and 3; Fig. 5 is a plan of a detail showing a portion of a row of the work piece holding chuck segments; Fig. 6

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is a view looking at the work member engaging side of one of the chuck segments, the view being taken on the line 6—6 of Fig. 5; Fig. 6' is a typical section of a detail, taken on the line 6'—6' of Fig. 6, and on the line 13'—13' of Fig. 13; Fig. 7 is a diagram illustrating the operation of the hydraulic pressure actuating mechanism by which the work piece holding chuck segments are caused to function; Figs. 8 to 12 inclusive are plans showing some of the various types of work piece holding chuck segments which may be employed; Fig. 13 is a side view of one of the work piece holding chuck segments shown in Figs. 8 to 12 inclusive, the view for illustration being taken on the line 13—13 of Fig. 10; Fig. 14 is a top plan of an alternative construction of my improved work holder, portions thereof being broken away and in section; Fig. 15 is a section taken approximately on the line 15—15 of Fig. 14; Fig. 16 is a section of a detail taken approximately on the line 16—16 of Fig. 14; Fig. 17 is a cross section taken approximately on the line 17—17 of Fig. 15; Fig. 18 is a perspective view of one of the collets disclosed in Fig. 14; Fig. 19 is a section of a detail taken approximately on the line 19—19 of Fig. 14, showing a collet held in the channel of the work holder body and a work member held therein; Fig. 20 is a section of a detail showing an alternative application of my improvement, and Fig. 21 is a plan showing a buffer element recessed into the forward face of one of the chuck segments.

The present invention has incorporated into a single organization of operating members, within a suitable body or housing A, of any suitable length, a series of aligned chuck units B, in which work pieces such as C (Fig. 4), of any configuration desired are held rigidly in an aligned row, to be cut, ground, polished or otherwise worked. The body A is of oblong or any desired shape and as shown is provided with suitable horizontal and vertical slotted end bosses 20 by which it may be bolted or clamped on the bed or other support in a milling machine, shaper, planer, or any other machine tool, with the work pieces, such as C, having their lower portions such as 21 (Fig. 4), or other supporting means clamped securely in the chuck units B. The chuck units B are held in a horizontal and longitudinal channel D, said channel being of any desired length in one side of the body A, and said side for the purpose of this description being termed the top or upper side. The channel has a pair of longitudinal and vertical sides 22 (Fig. 4), and is closed at both ends. It is formed with a pair of inwardly pro-

jecting longitudinal oppositely disposed spaced ledges 23, upon the lower ends of its sides, upon which the chuck units, while in upright position are slidably supported. The channel also has a corresponding pair of parallel longitudinal gib shoulders 24, upon the upper ends of its sides by which the chuck units are slidably retained in the channel.

The chuck units B may be variously formed, the construction shown in Figs. 1 to 6 inclusive, disclosing a chuck unit composed of a pair of loosely disposed independent segments 25 and 26, resembling plates or blocks, the lateral ends of which correspond with the inner side walls of the channel D, so as to slide freely and longitudinally therebetween and upon the supporting ledges 23. The segments of each pair are formed with vertical inwardly facing grooves 27 and 28 to engage and hold the lower stem portion 21 (Fig. 4), of each work piece C, when the segments are clamped together under longitudinal pressure exerted at one end of the channel. The upper ends of the segments as shown terminate flush with the top surface of the body and are formed with gib-ways 29 to receive the gib shoulders 24, the latter functioning to gib and slidingly hold the segments of a series of the chuck units in the channel.

Normally a clearance space 30 is provided between the members of each pair of segments so that when closing pressure is applied at the forward end of the channel the surfaces 27 and 28 engage and tightly hold a work piece. This space 30 is substantially closed by resilient buffer members 31 (Figs. 5 and 6), to prevent chips and grindings from obstructing free movement and causing wear. They also serve to expand and retain the segments in wide open position when pressure is not applied so that the work pieces may be freely inserted or removed.

The buffer members 31 may be bonded by cementing in place on the surface of member 26. A stop 31' (Fig. 6') of less thickness than the thickness of the buffer member on the body member 26 is placed adjacent to the buffer to limit compression of the latter and prevent its damage. In this manner the stop members have a stop function relative to the resilient buffer members. In a similar manner and for a similar purpose a resilient buffer member 32 is secured on the forward side 33. When desired the buffer member 32 may be let or recessed into the face of chuck segment 25 as indicated in Fig. 21.

In use a series of the chuck units is assembled horizontally and longitudinally, as shown in Figs. 1 and 3, in the channel D and when loaded with work pieces to be machined the chuck units are compressed longitudinally by force applied against the forward end of the series, the form of pressure actuator as disclosed in Figs. 1 to 4 inclusive being of hydraulic type and having a ram head E, which is included in the body A to play horizontally and longitudinally against the forward end of the row of chuck units B and simultaneously compress the members of the entire series evenly. The rearward end of the channel D has the gib shoulders 24 cut away and an abutment 34 formed across and closing the channel, thus leaving a gate opening or chamber 35 through which the segments 25 and 26 of the series of chuck units may be assembled in or removed from the channel. After assembling in the channel, an abutment block 36 is removably inserted to close the gate opening 35. In this manner the chuck units may be easily and quickly

changed to provide different chuck units for holding various types of work pieces. Also the series of chuck units is adapted to be held in the channel with the work pieces clamped therein in rigid alignment in position to be worked with precision by a machine tool. The type of chuck unit disclosed in Figs. 1 to 5 inclusive has a relatively thick member 26 to provide a rigid non-yielding back, and a comparatively thin flexible forward member 25, to compensate for inequalities of the lower stem portion of the work piece which is held by the chuck unit when the chuck units are compressed by the ram head E.

In Figs. 8 to 13 inclusive, some of various types of chuck units are shown. In Fig. 8 the members are comparatively thin plates and are provided with a vertical work piece stem engaging opening 38, of comparatively small diameter, in their faces. With this type a comparatively large number of work pieces can be held in the channel and worked simultaneously by the use of my improved work holder. In Fig. 9 the engaging grooves 39 are designed to engage and hold a work piece holding stem of hexagonal cross section and the segments are weakened by vertical grooves 40 to compensate for inequalities and distribute holding force evenly. Clearance spaces 41 are also provided for the same purpose. In Fig. 10, in a somewhat similar manner weakening grooves 42 are also provided and the engaging grooves constitute a rectangular work piece gripping surface. In Fig. 11 a slightly modified form of engaging surface 43 is provided for holding a hexagonal type of work holding stem tightly engaged by the chuck unit. Fig. 12 illustrates a still further modification, and Fig. 13 illustrates the application of the resilient equalizing buffer plates 44 on the faces between the chuck segments in the construction shown in Figs. 8 to 11 inclusive. Also rigid stops such as 44' (Fig. 13), similar to the stops 31' (Figs. 6 and 6'), and for the same purpose may be employed.

The body A is provided with an open space 50 below the channel D to receive the grindings and chips from the work pieces, when the latter are released. Also to receive coolant oil which is used during the working operation. Ribs 51 across the space 50 serve to reinforce the body structure and maintain it rigid.

The pressure actuator as shown in Figs. 1 to 4 inclusive, comprises, a ram structure having a ram head E, said head in turn having an impelling rod 52 which is reciprocated horizontally and longitudinally through the cylinder 53 and a stop collar 54, the latter being held rigidly in said cylinder. The forward end of the cylinder is sealed closed by the plug 55 and the forward end of the piston rod 52 carries the piston 56 by which the ram head E is impelled, said piston being spaced from the plug 55 to provide a fluid actuating chamber 57 for propelling the piston and the ram head rearwardly and for holding the chuck units compressed in work piece holding position. An expansion spring 58, which is threaded freely over the piston rod 52 and compressed between the piston 56 and stop collar 54 is adapted to return the ram head E and piston 56 to initial at rest position, automatically, when fluid pressure in chamber 57 is released.

Any source of controlled fluid pressure for operating the ram structure may be provided within the spirit of the invention, that shown in Figs. 1 to 7 inclusive comprising a reciprocable hand operable compressor pump 60, which is incorporated into one end of the body. This pump has

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a walking beam 61 on its outer end which is reciprocated by hand by the application of a lever handle (not shown), to the connecting pin 62 and is coupled to the pump by the link 63. The walking beam is tiltingly mounted upon the bracket 64 which is secured to the end of the body. A fluid supply reservoir 65 for supplying liquid to the pressure actuating system by which the ram is operated is contained in the forward portion of the body and is sealed closed by the removable cover 66 (Figs. 2 and 4), which is fastened by bolts 66', said reservoir with its cover removed being shown in Fig. 3.

The hydraulic system employed, which is incorporated into the body is shown diagrammatically in Fig. 7, there being a main duct 67 from the pump leading into the fluid pressure actuating chamber 57, whereby the force developed through the actuation of the pump is applied to impel the ram and maintain the chuck units in work holding position. Fluid such as thin oil may be retained in the reservoir and supplied to the hydraulic actuating system. During the suction stroke of the pump, liquid is drawn into the duct ahead of the pump piston through the branch passage 68 and check valve 69. During the power stroke of the piston liquid is forced through the main duct 67 and past the check valve 70, the latter holding the pressure unless purposely released to permit the ram returning to work holding released position. A return duct 71 is connected through the body between the fluid actuating chamber 57 and the reservoir 65 by the check valve 72. To open said valve and release the pressure of liquid from chamber 57 an actuating stem 73, extending forwardly through body A from valve 72 is depressed by reversing the throw of the walking beam 61 and causing the free end 61' thereof to depress said stem. In this manner hydraulic pressure for actuating the ram and compressing the series of chuck units evenly and simultaneously is controlled by the operator. Also the chuck units are maintained in work piece holding condition without loss of pressure for any period desired. Should pressure subside as indicated by a pressure gauge 74 which is connected with the main duct 67, the pump can be reciprocated to increase the pressure. By-pass duct 68', which is connected between the main duct and the reservoir and controlled by a check valve 69', releases any excessive pressure of fluid back into the reservoir.

The check valves referred to above while of specific construction as shown do not form any particular part of the present invention, their construction not therefore being described in detail. The return duct 71 which enters the reservoir is shown provided with the strainer 75 in the reservoir through which the actuating liquid is forced to pass during each circuit. The pressure gauge 74 has its dial set in the face of the body and its actuating unit 76 mounted in a compartment 77 in the body to protect the actuating unit from grindings, chips and coolant oils, said actuating unit being connected with the reservoir 65 by the coupling 78. The pressure gauge is thus adapted to indicate the pressure in pipe 67 shown in Fig. 7, and in the compartment 65. The cover plate 66 which seals the reservoir also serves to close the compartment 77 and seal all working parts.

It is not necessary to employ a hydraulic pressure actuator for compressing and holding the series of loosely disposed pairs of chuck segments compressed, any type of compressor being ap-

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plicable for such use within the spirit of the invention.

Alternative construction

The alternative construction shown in Figs. 14 to 19 inclusive contains the principal elements of my improvement, the body F having the horizontal and longitudinal channel G substantially similar but of slightly different dimensions from that shown in Fig. 1. The hydraulic pressure actuator and its method of operation are also substantially similar to that described above excepting that the check valves which form no specific part of the improvement as shown are slightly different in detail. The return duct 100 for hydraulic pressure actuating liquid from the pressure chamber 101 in the cylinder 102, instead of being controlled by a depressible check valve 72 of the type shown in Fig. 1 is represented as a screw actuated valve 103 which is hand operated by the use of a handle 104. The pressure pump 105 which is incorporated into the body structure and connected with the reservoir 106 by duct 100' is also shown operated by a bell crank handle 107 and link 108.

Instead of holding a series of pairs of loosely disposed chuck segments aligned in the manner shown in Figs. 1 to 13 inclusive, in the channel G, a series of collets H of the general type shown and described in my copending application, Serial No. 483,501, above referred to are employed, said collets being split and contracted by force which is initially exerted by the combined bearing unit and ram head I'.

Each collet as shown in Figs. 18 and 19 resembles a hollow cylinder 110, split longitudinally and forming a gap 111, which permits the bore 112 of the collet to be contracted about the stem 113 of a work piece 114 to hold the latter rigidly in the work holder. The normal diameter of the collet substantially corresponds with the width between the inner side walls of the channel G and the overall length of the collet corresponds with the distance between the inner supporting ledges 115 and the upper surface of the body F of the work holder.

The upper portion of the channel is provided with the longitudinal pair of parallel gib shoulders 116 and the upper end of the collet has a corresponding pair of gibways 117 which serve to guide the collets horizontally and longitudinally and prevent them from turning in a horizontal plane in the channel. Longitudinal weakening channels or slots 118 in the body of the collet permit the collet to contract against spring tendency more readily. A horizontal series of collets in upright position is adapted to be slidably supported in the channel with the lower ends of the collets resting upon the supporting ledges 115 and their upper ends engaged by the gib shoulders 116. In this condition the split arms of each collet in the channel should face the ram head and bearing I'.

Independent bearing units I, to be hereinafter described are placed between each pair of collets of the series in the channel. The combined bearing unit and ram I' engages the forward collet of the series and the combined rearward bearing unit and abutment I' is placed in the gate opening 120 between the rearward collet of the series and the stationary abutment 119 which is integral with the body.

The rearward end of the channel G has the gib shoulders 116 cut away leaving a gate opening 120 through which the collets H and the various

bearing units may be inserted and assembled in or removed from the channel. After assembling, as described, the combined bearing unit and abutment block I' is removably inserted to close the gate opening 120. The various bearing units I, I' and I'' are of suitable dimensions and shapes to slidably rest upon the pair of parallel ledges 115 (see Figs. 15 and 19), with their upper ends substantially flush with the surface of the body and provided with gibways 121 (Fig. 14), in which the bearing units including ram head I'' are slidably engaged to prevent turning. The bearing unit such as I, between each adjacent pair of collets resembles a segment or plate which is constructed with opposite pairs of laterally diverging faces or shoulders, the pair of faces or shoulders 122 on one side being placed against the contractible arms of the adjacent rearwardly disposed collet and the opposite pair of diverging faces or shoulders 123 being placed against the body portion of the next forward collet in the channel G. The combined bearing unit and ram head I'' has a single pair of rearwardly diverging faces or shoulders 124 placed against the contractible arms of the extreme forward collet in the channel, and the combined rearward bearing unit and abutment block I' has a single pair of forwardly diverging faces or shoulders 125 placed against the body portion of the extreme rearward collet of the series in the channel.

When thus assembled in the channel and the ram head is forced against the series of collets and bearing units the collets are contracted and a series of work pieces are held rigidly engaged in alignment in the work holder under hydraulic pressure so that they can be worked effectively by a machine tool. When pressure is released the collets are automatically released thus freeing the work pieces.

When desired the device as shown in Figs. 1 to 4 inclusive may be used to work a series of small polygonal sided blocks such as J, indicated in Fig. 20, by placing said series while packed together and in longitudinal alignment upon a pair of supporting rails 130 and 131 in the channel D and holding the series firmly between the ram head E and the abutment block 36 under hydraulic pressure. In this condition the rails are held freely upon the supporting ledges 23 and below the gib shoulders 24. The upper portions of the blocks thus project above the surface of the supporting body A in rigid position to be worked by a machine tool.

Where the term "chuck segments" is used throughout this specification and claims following, I mean it to include the segments such as 25 and 26 which directly engage and hold the work pieces in the channel of the body and/or the bearing units I, I' and I'' which engage and hold the work pieces through intervening collets H in the channel of the body. Also where the terms "pressure means" or "pressure actuator" are employed, I mean said terms to include any form of pressure means exerted against an end of a series of work piece holding elements in the channel of the work holder, whether said means is hydraulic, mechanical, air driven or any other type of compressor.

In accordance with the patent statutes, I have described the principles of operation of my improvement together with the construction thereof which I now consider to represent the best em-

bodiment thereof, but I desire to have it understood that the construction set forth is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth within the spirit thereof and within the scope of the following claims.

I claim:

1. In a work holder, a body having a longitudinal channel in its surface and an abutment at the rearward end of said channel, a series of independent segments engaged and freely movable longitudinally in said channel against said abutment, the inwardly directed sides of each pair of segments having work piece engaging surfaces by which the work pieces are held in position to be worked by a machine tool, a hydraulic pressure pump contained in said body having reciprocable hand operated means for applying pressure by a forward stroke, and valve means for controlling the hydraulic pressure applied by said pump, said valve means being actuated into released position automatically by a portion of the backward stroke of said hand operated means to release the pressure applied against said segments.

2. A work holder, comprising, a body having a retaining receptacle, a plurality of contractible collet units movably disposed and confined within said receptacle, the members of said units being normally spaced apart to freely receive work members therein and said receptacle being common to all of said units, elastic spacing means interposed between the members of each of said collet units, and compressible means directed against said collet units and coacting with said retaining receptacle to simultaneously apply closing pressure evenly against all of the collet units to contract the latter, whereby the work members are held rigidly in working position by said body, resilient means applied to retract said compressible means to automatically release said collet units from engaging said work members, and rigid stop means connected with the members of said collet units to limit the compression of the latter when engaged with the work members.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,339,800	Obecny	Jan. 25, 1944
2,335,258	Butler	Nov. 30, 1943
864,862	Reynolds	Sept. 3, 1907
1,102,314	Yerzley	July 7, 1914
1,085,785	Baker et al	Feb. 3, 1914
1,196,772	Gaede	Sept. 5, 1916

FOREIGN PATENTS

Number	Country	Date
538,132	British	July 22, 1941
535,905	Germany	Oct. 16, 1931

OTHER REFERENCES

American Machinist of Nov. 3, 1937, pages 1045 and 1046, the structure being shown at the top of page 1046—Class 90-59 (page 1046 of the above is available for inspection in Div. 13).