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4 SHEETS--SHEET 1.

Fig. 1

Inventor
George J. Blum
By Miller Churchill & Parker
Attys.

Inventor
George J. Blum
By Miller Chirshel & Parker Attys:

G. J. BLUM.
PUNCH PRESS.

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4 SHEETS—SHEET 2.

1,382,464.

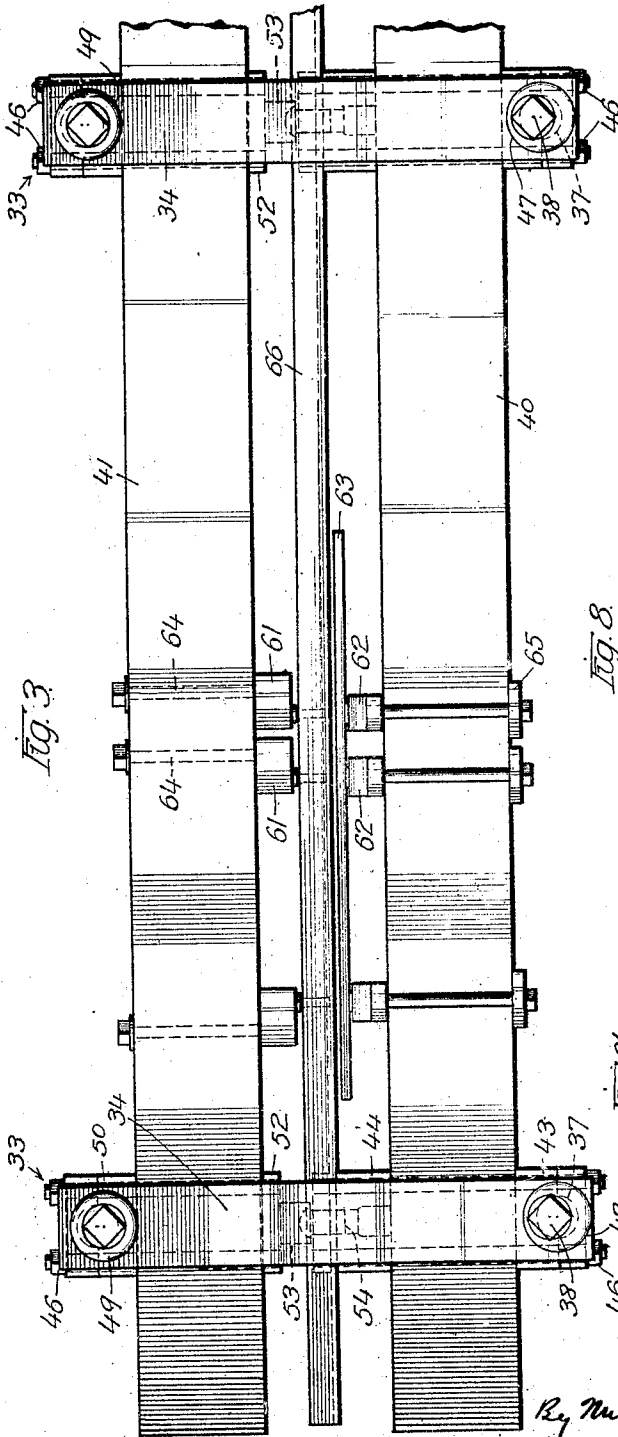


Fig. 3

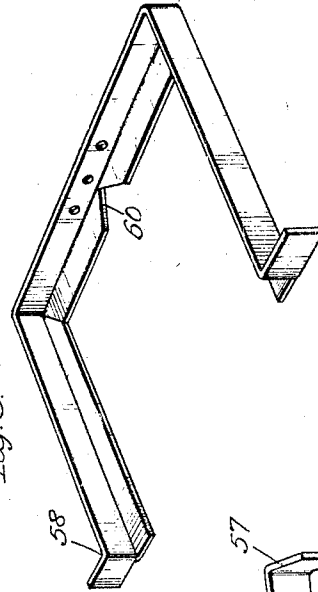


Fig. 8

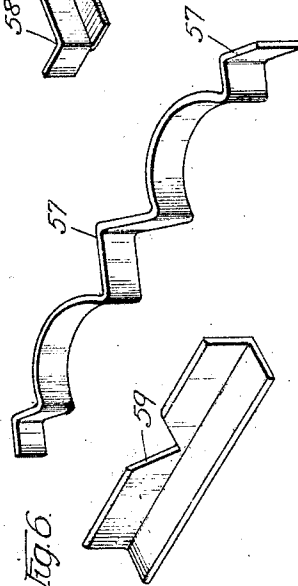
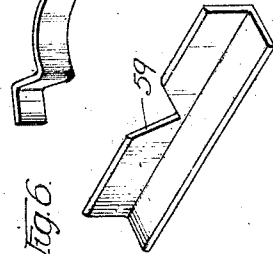


Fig. 7

Fig. 6



Inventor
George J. Blum
By *Muller, Churchill & Parker*
Attys.

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4 SHEETS—SHEET 3.

Fig. 4.

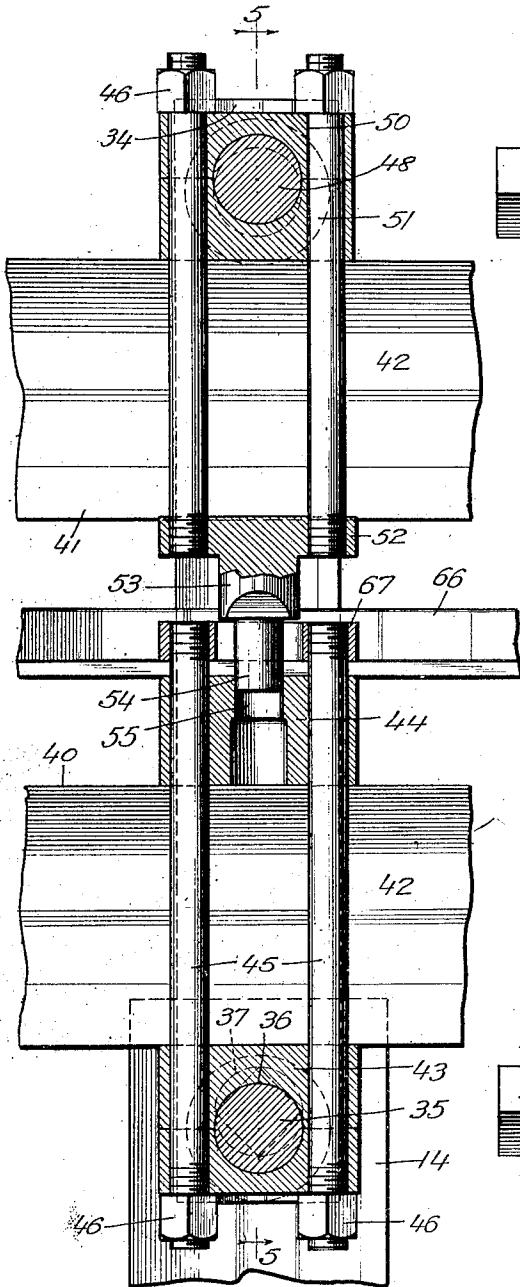
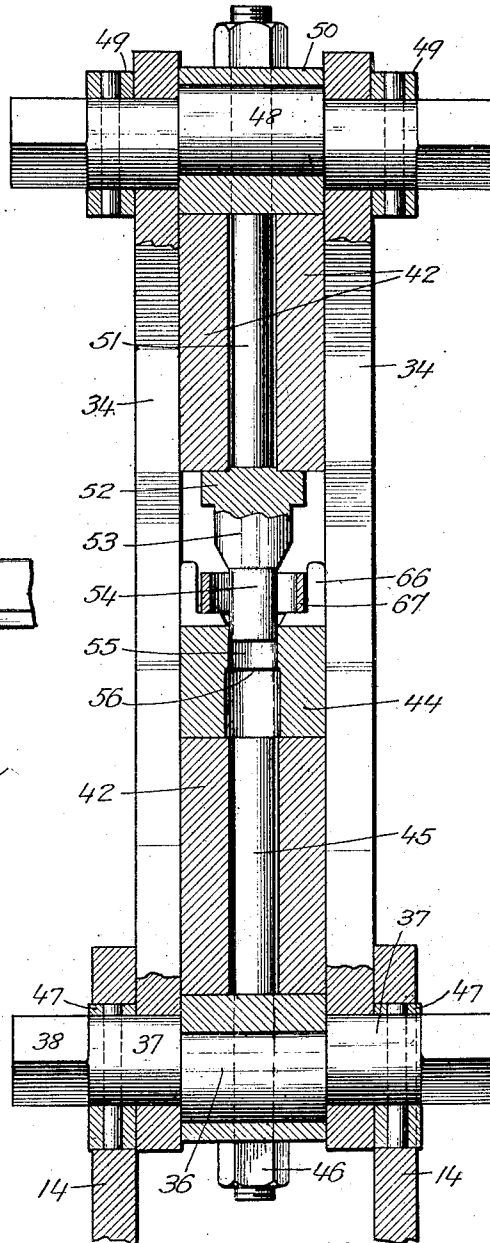


Fig. 5.



Inventor
George J. Blum
By Miller, Chinsch, Parker & Co. Attys.

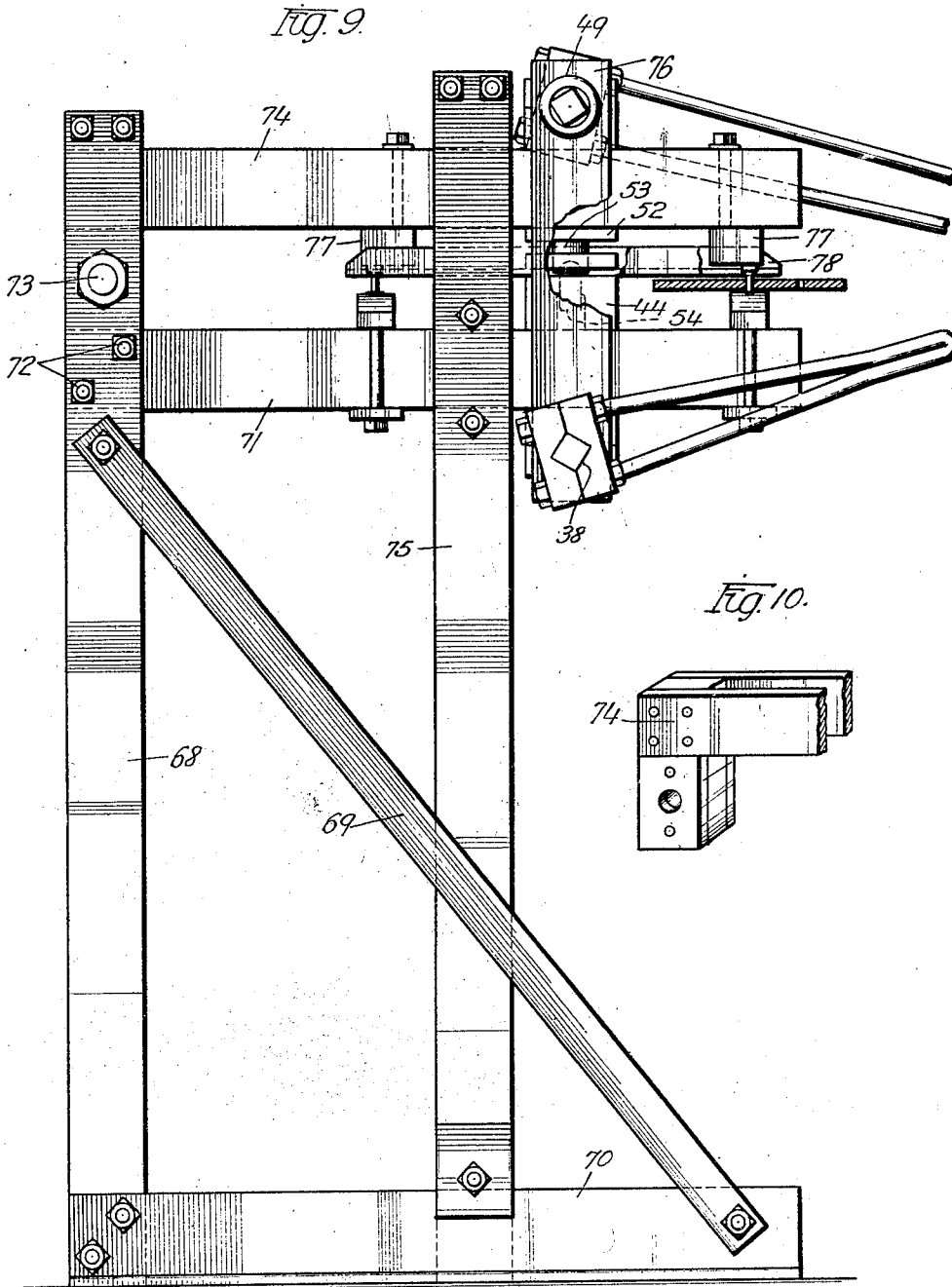
G. J. BLUM.
PUNCH PRESS.

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4 SHEETS—SHEET 4.

1,382,464.



Inventor
George J. Blum
By Miller Chindell Parker
Attys.

UNITED STATES PATENT OFFICE.

GEORGE J. BLUM, OF CHICAGO, ILLINOIS, ASSIGNOR TO ARMSTRONG-BLUM MFG. COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PUNCH-PRESS.

1,382,464.

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To all whom it may concern:

Be it known that I, GEORGE J. BLUM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Punch-Presses, of which the following is a specification.

My invention relates to machinery for bending, cutting, punching, shearing and similar operations on metal plates or structural shapes and more specifically to an improved press for performing these operations.

One of the objects of my invention is to make a press entirely of rolled material or material of standard shapes and sizes, using no special castings of any sort.

Another object is to provide a machine having a wide range of adjustability as to the leverages available so that forces of widely varying magnitudes may be readily obtainable for work of various sorts.

Another object is to provide a machine which can be quickly and easily equipped with tools for performing almost any sort of operation upon the material such as cutting, bending, punching, shearing, etc.

An advantage of the construction I employ is that a plurality of tools for performing a large number of different operations can be independently mounted on the machine and used either simultaneously or successively to perform complicated shaping operations with a minimum of expenditure of time and energy.

Further objects and advantages of my invention will become apparent as the description proceeds.

In the accompanying drawings, Figure 1 is a side and Fig. 2 an end elevation of a full size or double standard machine embodying the principles of my invention. Fig. 3 is a side view on a somewhat larger scale of the main bars with the yokes and eccentrics. Fig. 4 is a section on the line 4—4 of Fig. 2 through one of the yokes and Fig. 5 is a section on the line 5—5 of Fig. 4. Figs. 6, 7 and 8 show a few examples of the type of work the machine may be used to perform. Fig. 9 is a side elevation of a similar type of machine equipped with only one yoke. Fig. 10 is a perspective detail of the rear end of the upper arm of the machine illustrated in Fig. 9.

A device according to my invention is es-

entially a blank frame comprising two main arms extending in parallelism, and means for moving said arms toward and away from each other. In the embodiment illustrated in Fig. 1, I have shown two yokes with link and eccentric means and a carrying framework adapted to support them in spaced relation. The main bars themselves are supported by the yokes in a manner to be hereinafter described.

As illustrated in Figs. 1 and 5, inclusive, the supporting framework comprises a pair of standards 10 and 11, each having a pair of slightly divergent legs, the legs 12 and 13 of the standard 11 each having an upper vertical portion 14, an intermediate inclined portion 15 and a lower vertical portion 16. Suitable spacing tubes 17 and 18 are clamped between legs 12 and 13 by bolts 19 to hold the legs rigidly in spaced relation.

I have illustrated a pair of angle bars 20 and 21 held in spaced relation by suitable sleeves 22 and bolts 23 and adapted to serve as a base or pedestal for the machine. The lower vertical portions 16 of the legs of each standard pass down inside the vertical flanges of these angle bars and are clamped thereto by suitable retaining plates. From diagonally opposite legs of the standards 10 and 11, horizontal extension arms 24 and 25 bifurcated for attachment at spaced points to the lower vertical sections 16, each extend past the aligned leg on the other standard. The bolts 26 at the right-hand end of Fig. 1 pass through both clamping plates 27 and 28 (see Fig. 2), the first of which is held in alinement by spacer block 29 and engages the angle bar 20 to clamp it to the standard, and the second of which clamps the arm 24 between it and the section 16. The clamping attachment at the bifurcated end of the arm comprises a single bolt 30 and a single plate 31 held in alinement by suitable spacer block. It will be seen that each standard 10 and 11 constitutes a rigid unit with a horizontal arm projecting in the direction of the opposite standard and that these standards may be clamped together in any spaced relationship on any suitable base.

A yoke 33 is supported at the upper end of each standard. As these yokes are duplicates a detailed description of one will be sufficient. Each yoke comprises a pair of drag links 34 perforated at each end to receive the eccentrics 35. The lower eccen-

tric comprises a central eccentric portion 36 and two alined end portions 37 passing through the links 34 and the upper ends 14 of the legs of the standard and terminating in squared ends 38 to which suitable crank arms 39 may be attached. Each of the main beams 40 and 41 comprises a pair of spaced rectangular metal bars 42 extending through both yokes as illustrated in Fig. 1. Between the links 34 of the yoke 33 the bars of the lower beam 40 are clamped in spaced position between blocks 43 and 44 held in place by any suitable means herein illustrated as stud bolts 45 equipped with extra long nuts 46. The lower block 43 receives the eccentric portion 36 of the eccentric and reciprocates with relation to the links 34 upon rotation of the eccentric. The lower eccentric 35 not only produces relative motion between the links 34 and the block 43 upon rotation, but constitutes a support for the yoke 33 and the main beams 40 and 41. In order that the lower main beam 40 may remain stationary during the operation of the machine this support is accomplished by eccentric washers 47 suitably pinned on the alined portions 37 of the lower eccentric and rotating in bearings formed in the upper ends 14 of the legs of the standard. These eccentric washers are so mounted on the alined portions of the eccentric that their centers are in alinement with the central eccentric portion 36. It will be seen that upon rotation of the lower eccentric the so-called eccentric block 43 will remain stationary with respect to the standard while the links 34 will be moved with respect to both the block 43 and the standard.

The upper eccentric 48 is a duplicate of the lower eccentric but its washers 49 act merely as retaining members to hold the links 34 and the intervening eccentric block 50 in sliding engagement. This eccentric supports the upper main beam 41 which is clamped to the eccentric block 50 by upper stud bolts 51 entering the lower block 52. To maintain the upper and lower beams in vertical alinement with respect to each other I have employed suitable interengaging parts on the lower clamping block 52 for the upper main beam 41 and on the upper clamping block 44 for the lower main beam 40. In Figs. 4 and 5, I have illustrated means for preventing relative longitudinal movement of the beams comprising a downwardly projecting boss 53 terminating in a cylindrical tit 54 on the lower clamping block 52 for the upper main beam, and a registering hole 55 in the lower clamping block adapted to receive the tit. This hole is enlarged at 56, engaging the tit for purposes of guidance for a short distance only.

In Fig. 1 I have illustrated a pair of central shear blocks A carried by the main beams, V-shaped dies B on the right hand

end of the main beams adapted to produce such bends as that at 57 in Fig. 7 and at 58 in Fig. 8, and a V-shaped punch C at the left hand end of the main beams adapted to cut away a notch such as the notch 59 in Fig. 6, or notch 60 in Fig. 8. In Fig. 3, I have illustrated a plurality of punches 61 clamped in predetermined spaced relation along the main beam 41 and suitable dies 62 on the lower main beam coöperating with the punches to work on a piece of material indicated at 63. The spaced bars 42 afford a very convenient adjustable support for the tools used, which may be clamped at any point as in Fig. 3 by bolts 64 extended between the bars. Where the center part of the tool is hollow as in the case of dies 62, the dies may extend outside the bars and be bolted to suitable clamping plates 65.

In performing punching operations, I prefer to employ stripper bars 63 to hold the work down when the punches are moved up. I have illustrated opposed angle irons 66, (see Figs. 3, 4 and 5) clamped in position on top of the clamping block 44 between the clamping block and the nut 67 which receives the stud ends of the bolts 45.

Referring again to Fig. 1 it will be noted that a given relative displacement of the main beams 40 and 41 produced by the right-hand yoke 33 will move the V-shaped dies B a distance somewhat greater than that covered by the eccentrics whereas it will move the shears A in the center approximately half the distance corresponding to the motion of the eccentrics and will move the V-shaped punch at the left approximately one-fifth of this distance in the opposite direction.

The ratio of the diameter of the eccentrics to their throw is so designed that when under load they will be held by friction in any position to which they are moved. If, therefore, it is found that a piece of material to be notched at the left-hand end of the machine illustrated in Fig. 1 is so heavy that the workman cannot force the beams together by operating the left-hand yoke he can operate the right-hand yoke to bring the beams as near together as possible at the right end and then after setting the left hand eccentrics to bring the punching tools firmly against the work he can operate the right-hand yoke to separate the beams and exert a force upon the work approximately five times as great as that available upon operating the left-hand yoke.

Similarly, if it is found that a sufficient force cannot be exerted to operate the central shears on a given piece of material, these shears can be readily loosened and slid toward one of the yokes increasing the leverage of the other yoke by any desired amount. It will be seen that a large number of tools of all sorts can be simultaneously mounted

upon the main beams 40 and 41 in various positions and that practically any force up to the breaking strength of the eccentrics can be exerted on any tool. The range of adjustability is still further increased by making the arms 39 of various lengths as illustrated. It is obvious that an arm of any desired length may be mounted on either end of any eccentric in any one of a plurality of angular relationships. Less force can be exerted by pulling on a short arm, but where the short leverage is sufficient the short arm is quicker.

In Figs. 9 and 10, I have illustrated an embodiment of my invention employing only a single yoke. A stationary standard 68 suitably braced by diagonal braces 69 extending to the outer end of the floor beams 70 carries the inner end of the lower main beam 71 clamped by bolts 72 and has a pivotal mounting in the nature of a large bolt 73 located only slightly above the fastening for the lower main beam 71 upon which the upper main beam 74 rotates. The upper main beam extends as illustrated approximately parallel to the lower main beam and has a downwardly extending projection built solidly into an integral structure with the horizontally extending portion as illustrated in Fig. 10, and adapted to receive the bolt 73. The slidable standard 75 is generally similar to standards 10 and 11 except that it carries no horizontally projecting arm. It may be clamped in adjusted position at any distance from the stationary standard 68 by suitable bolts and is also a support for the lower main beam 71. The yoke 76 is in all respects a duplicate of the yokes illustrated in Figs. 4 and 5 except that the lower eccentric need not have eccentric washers as the yoke is supported by the main beam instead of supporting the main beam as in the double standard machine. I have illustrated a pair of punches 77 located one beyond and one inside the yoke 76 and standard 75 and a pair of stripper bars 78 similar to the stripper bars 66 in Fig. 3 extending in both directions from the yoke.

It will be obvious that the smaller machine illustrated in Fig. 9 differs from the double standard machine only in a number of operations that can be simultaneously or successively performed upon it without stopping to change tools as any force up to the breaking strength of the bolt 73 can be easily obtained by suitable relative adjustment of the positions of the tools and the yoke.

It will be seen that I have provided a press of general utility and of an extremely wide range of adjustability. The combined throws of the four eccentrics of the two standard machines can be arranged in an almost infinite variety of operative relationships to perform widely varying classes of work from cutting light sheets of tin to

punching and shearing heavy plates or structural shapes. The entire framework and all parts of my machine are built themselves of standard structural shapes resulting in a great saving in the cost of manufacture as well as in greater strength and reliability.

While I have illustrated and described in detail the preferred embodiment of my invention, it is to be clearly understood that the description is only for purposes of illustration and that many variations and modifications will naturally occur to those skilled in the art. I aim in the subjoined claims to cover all such legitimate modifications and variations.

I claim as my invention:—

1. A punch press comprising a pair of spaced main beams extending in approximate parallelism and a pair of mechanisms adapted to be associated with said beams at any selected spaced points along their length to move said beams toward and away from each other.

2. In a punch press, in combination, spaced main beams, a pair of yokes embracing said beams at points spaced along the length of said beams, each yoke comprising means engaging said beams for moving each of said beams with respect to said yoke, whereby said beams may be moved toward and away from each other.

3. In a device of the class described, a pair of standards, means for clamping said standards in any desired spaced relation, a yoke supported by each standard, upper and lower main beams supported by said yokes, and a plurality of eccentric means associated with each yoke for moving said main beams toward and away from each other.

4. A device of the class described having, in combination, a pair of elements extending in approximate parallelism and a pair of mechanisms adapted to be associated with said elements at any selected spaced points along their length to produce a relative motion between said elements, each of said elements being adapted to receive tools in clamping engagement at any point along its length.

5. A device of the class described having, in combination, an eccentric comprising cylindrical portions having parallel spaced axes, intermediate supporting means engaging certain of said portions, and fixed supporting means supporting said intermediate supporting means for rotation about an axis coincident with the axis of another portion.

6. A device of the class described having, in combination, an eccentric comprising aligned cylindrical portions and another cylindrical portion eccentric thereto, washers fastened to said aligned portions having their outer surfaces cylindrical and concentric with the axis of said eccentric portion, and

bearing members engaging said washers for supporting said washers and said eccentric.

7. A device of the class described having, in combination, a pair of main beams, a yoke 5 associated with said main beams comprising blocks clamped to said main beams, an eccentric in each of said blocks, and links extending between said eccentrics.

8. A device of the class described having, 10 in combination, a main beam, blocks clamped on said main beam, an eccentric, one of said blocks being adapted to receive a portion of said eccentric, a second main beam, eccentric and blocks, said beams being dis- 15 posed with the eccentric receiving blocks on the farthest edges of said beams, and links extending beside said beams between said eccentrics, said eccentrics and links being adapted to move said beams toward and 20 away from each other, and said links constituting guiding members for said beams.

9. In a device of the class described, in combination, a yoke comprising spaced eccentrics and links connecting them, and a 25 plurality of operating levers of various lengths for said eccentrics, each lever adapted to be associated with any eccentric in any one of a plurality of different angular relationships.

10. A device of the class described having, 30 in combination, spaced parallel main beams, a plurality of yokes associated with said main beams at points spaced along the length thereof and adapted to move said 35 main beams toward and away from each other, a standard supporting each yoke, and a base supporting said standards, said yokes being slidable along said main beams to be clamped thereon at any desired point and 40 said standards being slidable along said base to support said yokes in any position.

11. A device of the class described having, in combination, two standards, a member associated with each standard extending past 45 the other standard, and means for clamping said members to said standards to fasten said standards any desired distance apart.

12. A device of the class described having, in combination, two standards, an extension 50 associated with each standard extending past the other standard, a base comprising longitudinally extending members lying adjacent the lower extremities of said standards, and a single clamping means for 55 clamping said extensions to said standards and said standards to said base.

13. A device of the class described having, in combination, a pair of standards, means for supporting said standards rigidly any 60 desired distance apart, a yoke carried by each standard, and parallel main beams supported by said yokes.

14. A device of the class described having, in combination, a pair of standards, a yoke 65 carried by each standard, each yoke com-

prising links connecting spaced eccentrics, eccentric blocks on each eccentric between said links, and means for supporting said yokes upon said standards comprising washers mounted on the alined portions of the 70 lower eccentric on each yoke, the outer surfaces of said washers being cylindrical and in alinement with the eccentric portion of said lower eccentric, said standards having bearings engaging the outer portions of said 75 washers.

15. A device of the class described having, in combination, a pair of main beams extending in parallel spaced relationship, means for clamping tools on each of said 80 main beams at any desired points, a pair of yokes adapted to be associated with said main beams at any desired spaced points along the length thereof, and eccentric means carried by said yokes for moving said main 85 beams toward and away from each other.

16. A device of the class described having, in combination, a pair of longitudinally extending main beams each beam comprising a pair of rectangular elements, means for 90 clamping the elements of each beam in parallel spaced relationship, means for moving said beams toward and away from each other, a plurality of tools adjustably clamped in position on said beams, certain of said 95 tools being adapted to support a piece of work to be operated upon by other tools, and stripper bars extending between said main beams parallel thereto and adapted to prevent said work from adhering to said 100 last mentioned tools upon withdrawal of said tools.

17. A device of the class described comprising spaced main beams, means including 105 pivoted links extending from one beam to the other for moving said beams toward and away from each other, and means for preventing relative longitudinal movement of said beams.

18. A device of the class described comprising spaced main beams, means including 110 pivoted links extending from one beam to the other for moving said beams toward and away from each other, and means in the nature of interengaging guide members for 115 preventing relative longitudinal movement of said beams.

19. A device of the class described having, in combination, spaced main beams, sets 120 of blocks clamped on said beams at corresponding points, certain of said blocks having interengaging projections and recesses for preventing longitudinal movement of said beams.

20. A device of the class described having, in combination, spaced main beams, sets 125 of blocks clamped on said main beams at spaced points, eccentrics operatively connected with certain of said blocks, links extending from an eccentric on one beam to 130

a corresponding eccentric on another beam, and means for rotating said eccentrics.

21. A device of the class described having, in combination, an upper and lower main beam, clamping blocks on said lower main beam, an eccentric carried by the lower clamping block on said lower main beam, clamping blocks on said upper main beam above said first mentioned clamping blocks, an eccentric carried by the upper clamping block on said upper main beam, links extending between said eccentrics, and means for rotating said eccentrics.

22. The combination recited in claim 21 in combination with a projection and a co-operating recess on the lower clamping block for said upper main beam and the upper clamping block for said lower main beam for preventing relative longitudinal movement of said beams.

23. A device of the class described having, in combination, spaced main beams, sets of coöperating tools on said beams, means for moving said beams toward and away from each other to operate said tools, and a stripper bar attached to one of said main beams adapted to facilitate withdrawal of tools carried by the other of said main beams from a piece of work.

24. A device of the class described having, in combination, spaced main beams, means associated with said main beams at a certain point along their length for maintaining said beams a fixed distance apart at said point, means intermediate the ends of said beams and spaced from said first mentioned means for moving said beams toward and away from each other, and tools adapted to be associated with said main beams at any desired point along the length thereof whereby any desired leverage between said tools and said means for moving the beams may be obtained.

25. A punch press having, in combination, spaced main beams, yokes associated with said main beams at spaced points,

each yoke comprising spaced eccentrics and links extending between them, and eccentric blocks clamped to said main beams and operated by said eccentrics, all said parts having simple shapes made up of parallelepipeds and cylinders whereby they may be cut from or readily machined out of stock material of standard shapes and sizes.

26. A punch press having, in combination, spaced main beams, yokes adapted to be associated with said main beams at any desired points along their length, each yoke comprising eccentric blocks clamped to said main beams, eccentrics in said blocks and links connecting said eccentrics, an adjustable standard for supporting each yoke, and means for supporting said standards in adjusted spaced relation, all said elements and means having simple shapes made up of parallelepipeds and cylinders whereby they may be cut from or readily machined out of stock material of standard shapes and sizes.

27. In a device of the class described, spaced main beams, and a pair of yokes embracing said beams, each yoke comprising means engaging each of said beams for moving said beams toward and away from each other, said means comprising movable members so arranged as to be frictionally held in any position into which they are moved.

28. In a device of the class described, spaced main beams, a pair of yokes embracing said beams, and a plurality of eccentric means associated with each yoke for moving said main beams toward and away from each other, the eccentricities and diameters of the eccentric portions of said eccentric means bearing such a ratio to each other that said eccentric means will be held by friction in any position into which they are moved.

In testimony whereof I have hereunto set my hand.

GEORGE J. BLUM.