

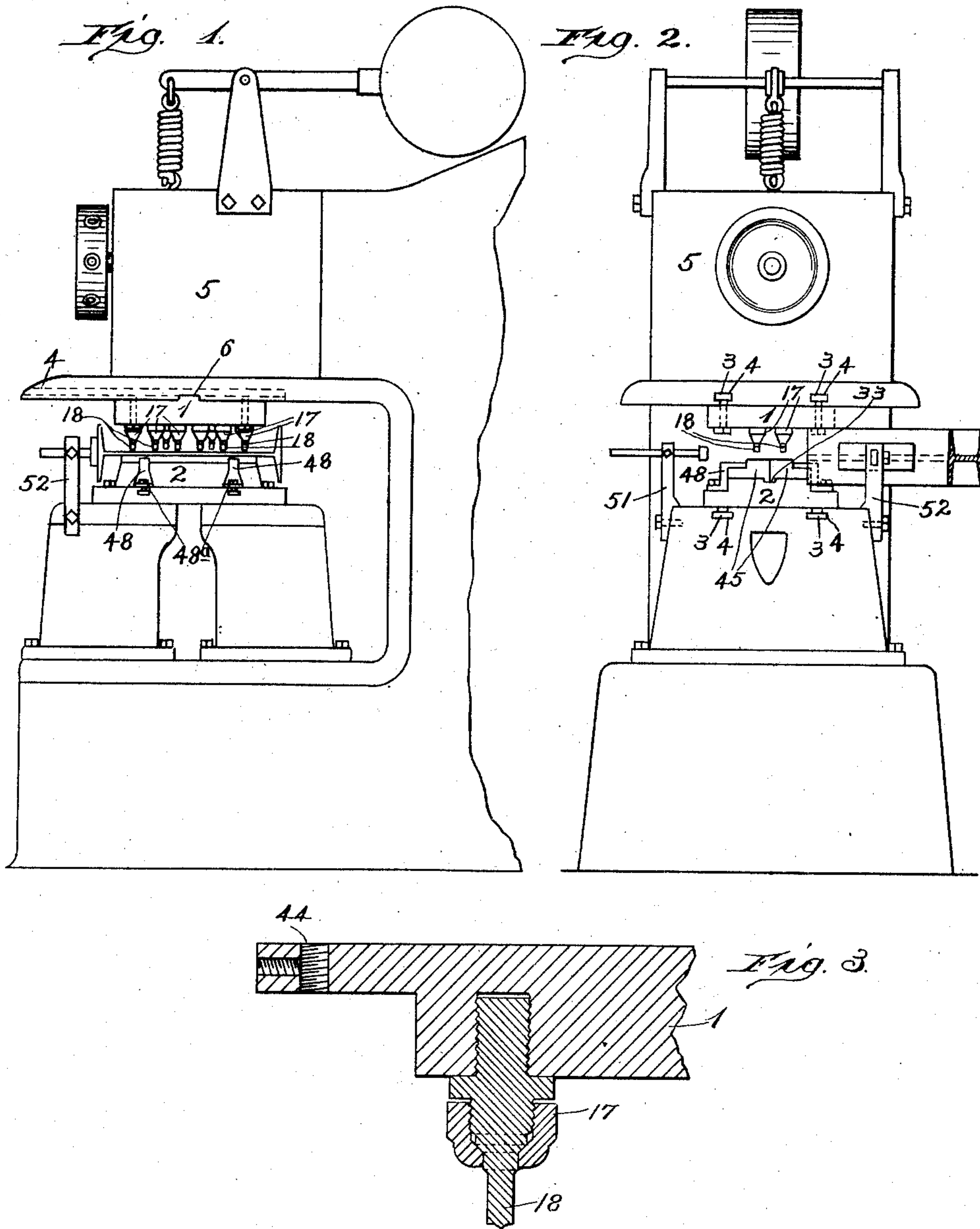
No. 874,194.

PATENTED DEC. 17, 1907.

C. H. HENDERSON.
STRUCTURAL IRON PUNCHING DEVICE.

APPLICATION FILED MAY 14, 1906.

2 SHEETS—SHEET 1.



Witnesses.
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Chas. E. Gorton.

Inventor:
Charles H. Henderson
By Rudolph M. [Signature]

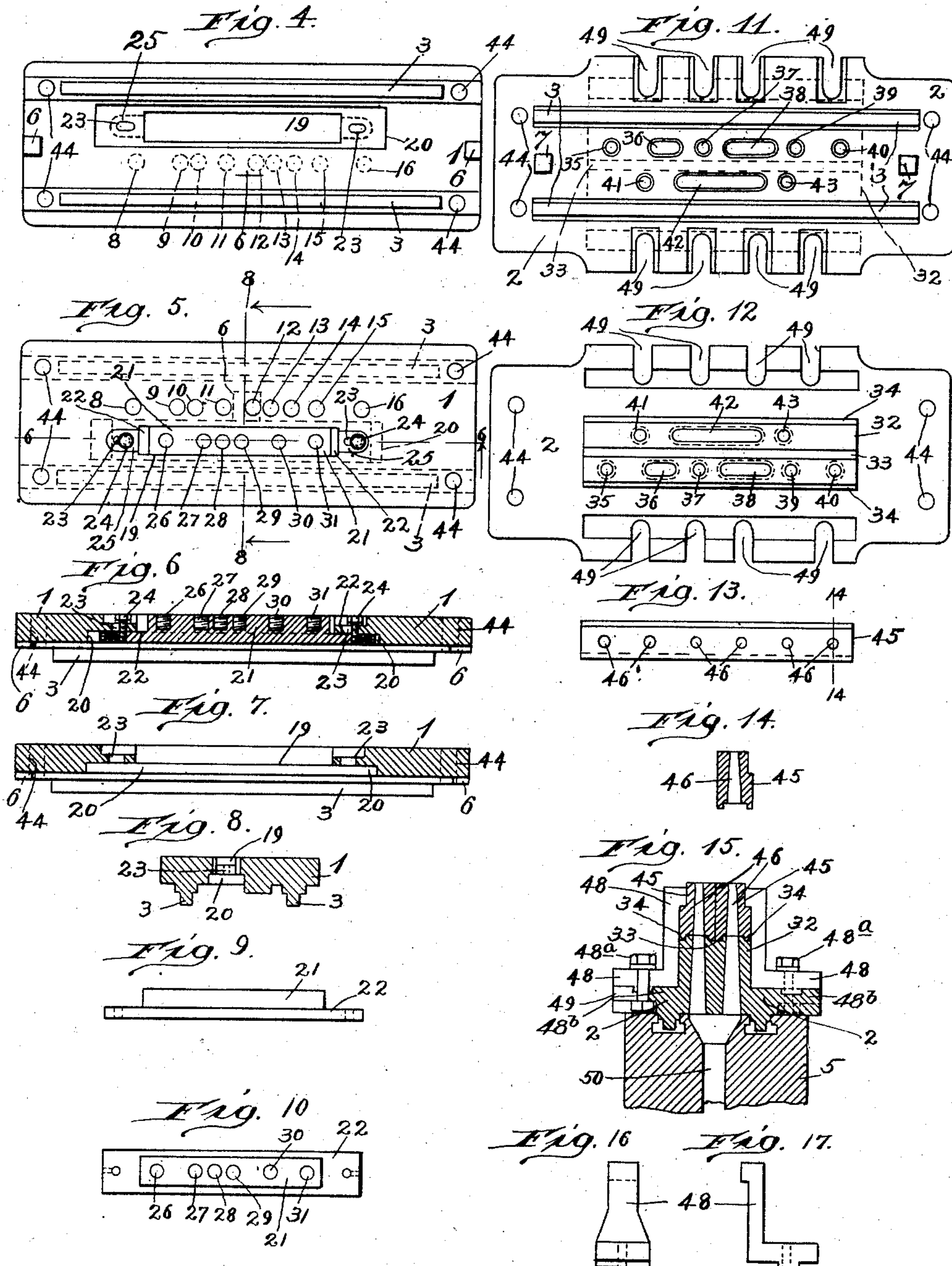
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Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES H. HENDERSON, OF CHICAGO, ILLINOIS.

STRUCTURAL-IRON-PUNCHING DEVICE.

No. 874,194.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed May 14, 1906. Serial No. 316,737.

To all whom it may concern:

Be it known that I, CHARLES H. HENDERSON, 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 Structural-Iron-Punching Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to novel devices for punching structural iron such as I-beams, channel bars and angle irons, the object being to provide means whereby the perforations for rivets may be differently spaced and varied in number with a single set of punches and the positions of such perforations accurately gaged, and consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings illustrating my invention: Figure 1 is a side elevation of a hand operated punch press fitted with punching devices constructed in accordance with my invention. Fig. 2 is a front elevation of the same. Fig. 3 is an enlarged detail sectional view of a male punch member employed. Fig. 4 is a top plan view of the male die block carrying the male punches. Fig. 5 is a bottom plan view of the same. Fig. 6 is a detail vertical transverse section on the line 6 6 of Fig. 5. Fig. 7 is a detail sectional view similar to Fig. 6, with the die block removed. Fig. 8 is a vertical longitudinal section on the line 8 8 of Fig. 5. Fig. 9 is a detail view in side elevation of the removable part of the male die block. Fig. 10 is a bottom plan view of the same. Fig. 11 is a bottom plan view of the female die block. Fig. 12 is a top plan view of the same. Fig. 13 is a top plan view of a female die member adapted to be mounted on the female die block. Fig. 14 is a detail section of the same on the line 14 14 of Fig. 13. Fig. 15 is a detail vertical section of the female die block showing the same assembled and mounted on the bed plate of the press. Figs. 16 and 17 are detail views in elevation of clamping arms employed to secure said female die members to the female die block.

Structural iron is at present punched in a very tedious and expensive manner owing to the fact that the rivet holes must necessarily be very accurately punched so that

those in the various pieces to be joined will register exactly.

As a general rule a relatively large number of pieces are required to be punched in identically the same places, and to this end I have invented punching devices by means of which varying numbers of holes may be simultaneously punched, the number of holes and their relative disposition, etc. being capable of variations to suit all requirements, and all being accomplished by the use of one pair of dies, the dies being supported in structures designated respectively the male and the female die blocks.

Briefly stated, the invention comprises a male die-block in which removable punches are adapted to be mounted, the positions of the latter being determined partly by the relative positions of holes therein in which the shanks of the punches are received, and partly by an adjustable member disposed in said die block and which carries some of the said punches. The female die block is provided with openings and slots disposed in vertical alinement with the punches of the male die blocks and is adapted to carry removable female die members provided with openings registering with said punches, said female die members being interchangeable, and the openings and slots in the female die blocks so arranged that all of the male die members will be so disposed relatively to the female die members as to provide ready passage for the disks punched out of the structural iron, the position of the latter being accurately gaged by means of a guide and stop. A hand-press is preferably employed for the reason that its slow action enables the operation to be closely watched, and any errors corrected before completing an operation.

In said drawings 1 indicates the male and 2 the female die block, each provided on one face with parallel ribs 3 which are adapted to enter and fit recesses 4 in the bed plate and plunger of the punch-press 5, to accurately position the said blocks relatively to each other in one direction, that is laterally, their relative positions longitudinally being determined by means of projections 6 and 7 on the ribbed faces which are adapted to enter and fit closely recesses in the bed plate and plunger of the press, said recesses being omitted from illustration. Formed in the opposing faces of said die blocks are openings, those in the male member desig-

nated by 8, 9, 10, 11, 12, 13, 14, 15 and 16, the openings disposed in a row in irregular order and threaded to receive the threaded shank of chucks 17 in which the punches 18 are secured and centered, one of said chucks and punches being shown in Fig. 3 and of well known construction. Disposed parallel with and adjacent to said row of openings 8 to 16 inclusive is a slot 19 of oblong form which communicates with a recess 20 of greater length and width in the upper face of said block, and constituting practically a lateral and longitudinal enlargement of said slot. Fitting snugly within said slot 19 is a head member 21 of less length than said slot, and which is provided on its side edges and ends with flanges 22 which are adapted to snugly fit on their side edges, into the said recess 20 and to rest upon the bottom of the latter. Beyond the ends of said slot 19 and inwardly of the ends of the recess 20, are longitudinal webs 23 through which the set-screws 24 are adapted to pass, said webs being disposed in the bottoms of recesses 25 (indicated in dotted lines, Fig. 4) in the lower face of said block 1, and are adapted to receive the heads of said set-screws. The said block 21 is longitudinally adjustable in said slot 19 and recess 20, and is provided in its lower face with threaded openings 26, 27, 28, 29, 30 and 31 respectively, which are also adapted to receive the shanks of said chucks 17, said openings being disposed at irregular intervals and in a row parallel with the row of openings 8 to 16 inclusive. The middle portion of said female die block 2 is provided with an oblong raised projection 32 provided in its upper face with a central lateral recess 33, and having its corners cut away to provide recesses 34 disposed parallel with the said recess 33. The said projection 32 is provided with two parallel rows of openings, the row opposed to the row 8—16 of the male block comprising, (reading from left to right Fig. 12), a circular opening 35, a slot 36, a circular opening 37, a slot 38 of greater length than said slot 36, and two circular openings 39 and 40. The said openings 35 to 40 inclusive are tapered and are smallest at their upper ends, the smallest diameter or area thereof being however considerably greater than that of the holes to be punched.

The openings 8 to 16 inclusive of the male die block 1 and the openings 35 to 40 inclusive of the female die block are arranged so that the opening 35 registers with the opening 8, the slot 36 registers with the openings 9 and 10, opening 37 registers with opening 11, slot 38 registers with openings 12, 13 and 14 and openings 39 and 40 register with the openings 15 and 16. The second row of openings in the female die block comprises a circular opening 41, a slot 42, and a circular opening 43, said openings 41

and 43 being adapted to register with the openings 26 and 31 of the block 21 when the latter is disposed midway between the limits of its movement, and the slot 42 is adapted to then register with the openings 27, 28, 29 and 30. All of the said openings 8 to 16 inclusive, 26 to 31 inclusive, and 35 to 43 inclusive, are relatively so spaced as to enable various combinations or relative disposition of openings in either one or two rows to be produced. That is to say, in some instances the I-beam of relatively large depth will be required to be punched with a single lateral row of perforations at each end, and sometimes likewise between its ends, or it may be required to punch two adjacent parallel rows, the openings of each row being disposed in staggered relation to those of the other. If the beam is of less depth, then the number of openings in each row, and in some instances the spacing thereof, is likewise varied, all variations being however within certain standard limits, and the adjustments rendered possible by my device being sufficient to cover such limits. The male die block is mounted in the press-punch and the female die block is mounted upon the body of the press, the relative positions of said blocks being fixed as hereinbefore described, and being held in such positions by means of bolts passing through the openings 44, in said die blocks. The chucks 17 which are adapted to receive the punches 18 are then mounted in the male die block in the desired openings to produce the combinations required. Female die members 45 having openings 46 spaced in accordance with the spacing of said punches 18, and corresponding in number with such punches, are then mounted upon the male projections of said female die block, and are securely held in place thereon by means of the Z-shaped clamps 48 which are secured to the flanges 48^b on the side edges of said female die block by means of bolts 48^a passing through openings in one arm of each of said clamps and entering recesses 49 in said side edges, and also entering the faces of said flanges of said female die block. The said dies 45 must necessarily be so mounted on said projection that the openings 46 therein register with the openings in said projection, so that the metal punched from the iron will find ready exit through said openings and through the slot 50 in the bed plate of the press. After mounting either one or both of said dies 45 on said projection of said female die block, to punch either one or two rows of openings, the block 21 is adjusted by moving the same laterally with relation to the male die block 1 until the punches carried thereby register exactly with the corresponding female die member, whereupon said punching devices are ready for operation. After so adjusting

the punches and the dies, it is necessary to properly set the stops 51 and guide 52 which are mounted upon the bed plate of said press, so that the I-beam or other piece of structural iron to be punched may be readily placed in proper relative position to punch the openings therein in exactly the proper places. To primarily accomplish this it will obviously be necessary to lay out on one of said pieces the exact position of the openings required, and then insert said piece between said die blocks 1 and 2 and adjust the position of the same relatively of the position of the punches and dies to cause said holes to be punched accurately. The first set is then preferably punched, and before the punches are withdrawn the stops and guides 51 and 52 are set so that the next piece may be readily calculated and accurately positioned. The operation may then obviously be repeated as often as necessary.

The I-beam or channel bars are generally secured to other transversely disposed I-beams or channel bars by means of angle irons, and the latter must accordingly also be punched to correspond with the punchings of the parts to be joined thereby, such angle irons are usually secured to the end portion of the web of one of said I-beams and the other flange thereof is secured to the web of a transversely disposed I-beam between the ends of the latter. The flanges secured to the end portion of the web of the first-named beam have the openings disposed usually about $\frac{1}{4}$ of an inch nearer the free edge of the flange than the distance of the openings in the I-beam to which said flange is secured are disposed to the end of said beam, so that said angle irons will project $\frac{1}{4}$ of an inch beyond the ends of the I-beam. The said clamps 48 serve as guides to determine the proper relative positions of said openings in one flange thereof to throw the same the desired distance nearer the free edge thereof.

While my said devices are particularly adapted for punching structural iron, as described, they may obviously be also employed for punching sheets and the like.

I claim as my invention:

1. A punching device of the character described, comprising a female die block having a longitudinal projection provided with longitudinal guide ways, die members bearing upon said guide ways and provided with a plurality of openings, means for detachably clamping said die members to said female die block, a male die block having a plurality of threaded apertures and with an elongated slot, a head member engaging the slot in said

male die block and provided with a plurality of threaded apertures, means for detachably clamping said head member in said slot, and punches adapted to be supported in the threaded apertures in said male die block and in said head member, said punches corresponding to and registering with the apertures in said die members.

2. A punching device of the character described comprising a frame including a bed and a movable plunger, a female die block bearing upon said bed and having a longitudinal projection provided with longitudinal guide ways, die members bearing upon said guide ways and provided with a plurality of openings, means for clamping said die members adjustably to said projections, a male die block having a plurality of threaded apertures and with an elongated slot, a head member bearing in said slot and provided with a plurality of threaded apertures, means for detachably connecting said head member in said slot, and a plurality of punches engaging said threaded apertures in said male die blocks and in the threaded apertures in said head member, said punches corresponding to and registering with the openings in said die members.

3. A punching device of the character described comprising a frame including a bed and a movable plunger, said bed and plunger having spaced guide recesses, a female die block bearing upon said bed and provided with spaced ribs entering said guide recesses and having a longitudinal projection on its upper face provided with longitudinal guide ways, die members bearing upon said guide ways and provided with a plurality of openings, means for clamping said die members adjustably to said projections, a male die block bearing against said plunger and provided with spaced ribs entering the recesses therein and having a plurality of threaded apertures and with an elongated slot, a head member bearing in said slot and provided with a plurality of threaded apertures, means for detachably connecting said head member in said slot, and a plurality of punches engaging said threaded apertures in said head member, said punches corresponding to and registering with the openings in said die members.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

CHARLES H. HENDERSON.

Witnesses:

RUDOLPH WM. LOTZ,
A. FRANK PHILIPSON.