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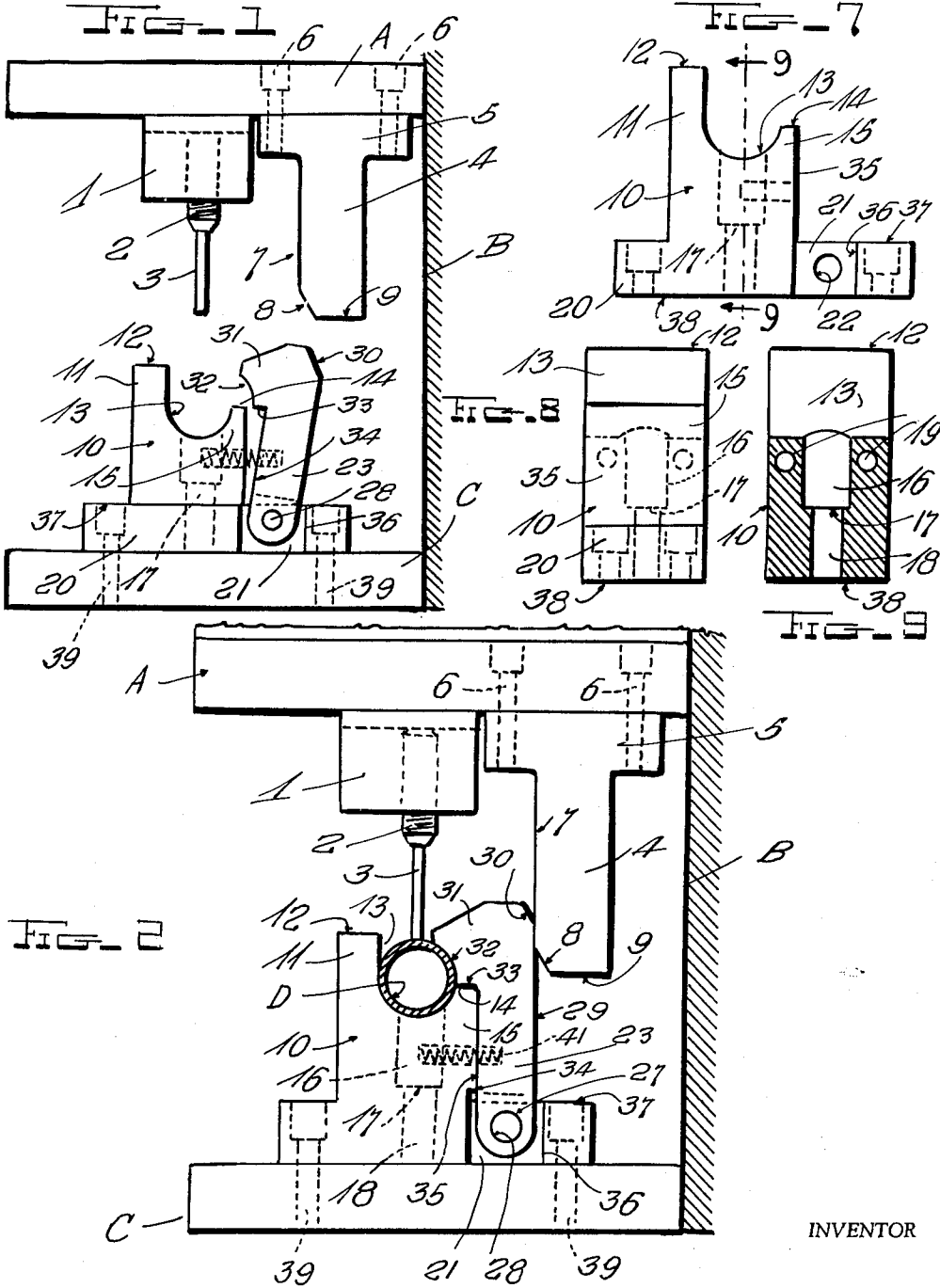
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TUBE SUPPORT AND CLAMP FOR PUNCHING MACHINES

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2 Sheets-Sheet 1



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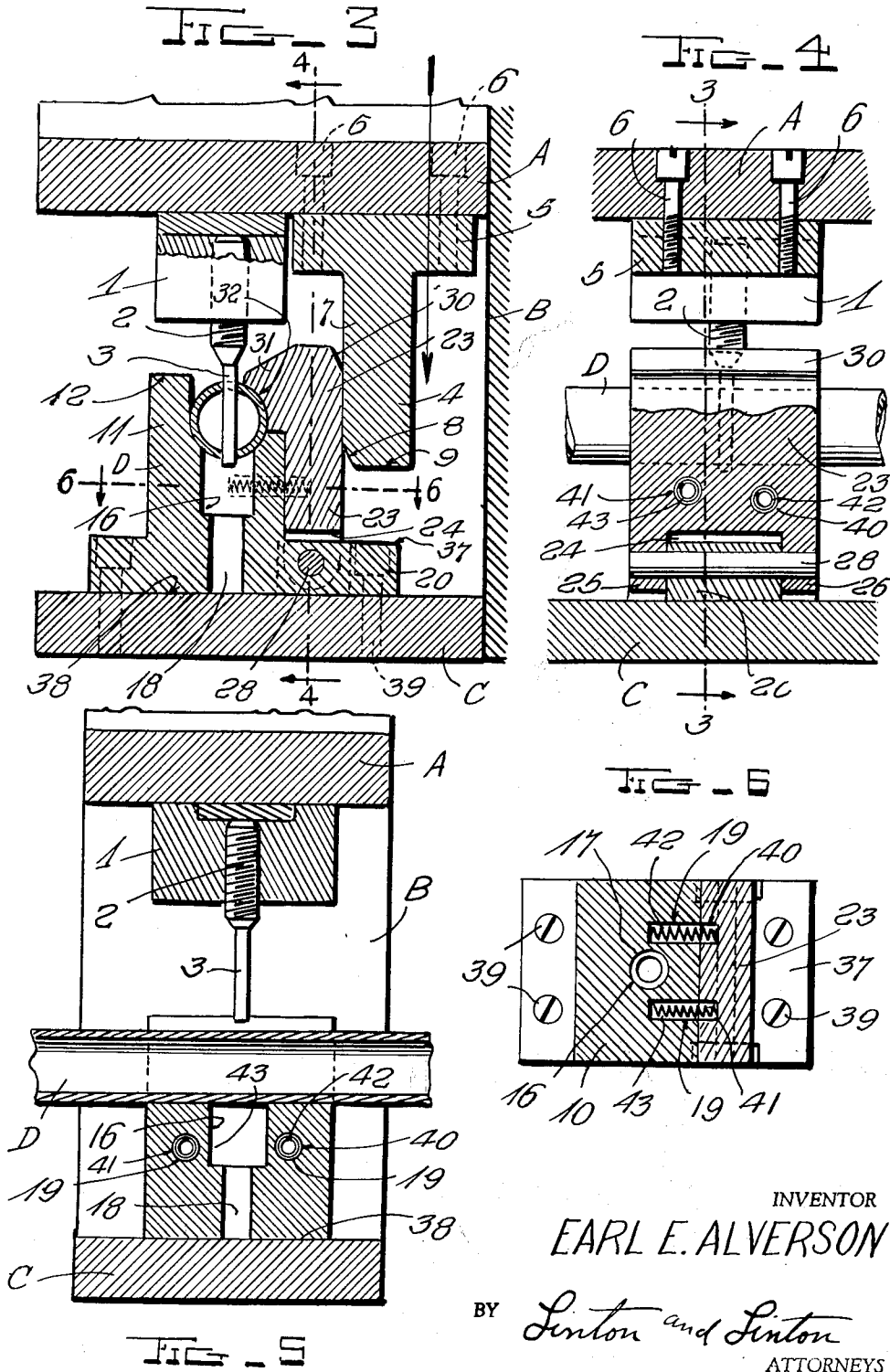
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**TUBE SUPPORT AND CLAMP FOR
 PUNCHING MACHINES**

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 Filed Feb. 1, 1961, Ser. No. 86,348
 1 Claim. (Cl. 83—383)

The present invention is directed to machines for punch-
 ing a hole diametrically through a length of tubing and
 is more particularly concerned with a self-operating clamp
 for the tubing which clamp forms a part of the punching
 machine.

The principal object of the present invention is to pro-
 vide elements forming an automatically and quick acting
 tube support and clamp which elements are readily com-
 bined with existing tube punching machines or can be
 formed with such machines during their initial produc-
 tion.

A further and important object of the invention is to
 provide a tube support as part of a tube clamping device
 which support provides a base at all times for tubing being
 present to and through punching machine, that is before,
 during and after the punching operation and also provide
 a passageway for the machine punch extending from the
 supported tubing upon said punch extending through said
 tubing.

Another and equally important object of the invention
 is to provide a tube punch and clamp having a base for
 supporting tubing and cooperating with a driven punch for
 forming an opening through said tubing as well as with
 elements for clamping said tubing to said base operable
 with said punch, but normally retained in a non-clamp-
 ing position leaving said tubing free for movement on or
 from said base.

A still further object of the invention is to provide a
 quick acting device operable by a tube punching machine
 for firmly holding a section of tube at its portion to be
 penetrated by said punch, which device automatically
 releases the tube except at such times as it is contacted
 by the punch and comprises positive acting non-binding
 elements which operate regardless of the presence of
 foreign material such as fine portions of metal, dirt and
 the like such as accumulate in metal working areas.

Further objects of the invention will be in part pointed
 out in the following description of the accompanying
 drawings wherein:

FIG. 1 is an end view of a portion of a punching press
 including the tube support and clamp forming the present
 invention with the elements thereof in their released
 position.

FIG. 2 is a view similar to FIG. 1, but with the elements
 in their tube clamping position.

FIG. 3 is a cross-sectional view taken on line 3—3 of
 FIG. 4.

FIG. 4 is a cross-sectional view taken on line 4—4 of
 FIG. 3.

FIG. 5 is a longitudinal section taken substantially at
 right angles to FIG. 2.

FIG. 6 is a cross-sectional view taken on line 6—6 of
 FIG. 3.

FIG. 7 is an end elevation of the base forming part
 of the present invention.

FIG. 8 is a side elevation of said base; and

FIG. 9 is a cross-sectional view taken on line 9—9 of
 FIG. 7.

Referring now more particularly to the accompanying
 drawings wherein like and corresponding parts are desig-
 nated by similar reference characters, A indicates a ver-
 tically reciprocating driven plunger forming part of a
 punching press, while B refers to the vertical support and

guide of said press, while C indicates the table of the press.
 These elements A, B and C are shown merely by way of
 an example as various types of devices having a vertically
 driven plunger and table can be employed with the tube
 support and clamp forming the present invention.

Plunger A has a punch retainer 1 connected to the lower
 face thereof and into which the end 2 of a punch 3 is
 inserted and fastened for moving said punch 3 vertically
 upwardly and downwardly towards table C.

A cam 4 providing the operating element of the pres-
 ent device has a base 5 connected to the lower face of
 said plunger by a plurality of bolts 6. The upright 7 of
 said cam is sufficient length so that the end 9 extends
 slightly beyond punch 3 with an inwardly slanting face
 8 provided adjacent said end 9 and extending inwardly
 on a slant towards said end and the axis of upright 7.

A tube support 10 has an elongation 11 terminated by
 a flat end 12 adjacent which is provided a J-shaped recess
 13 extending to the flat end 14 of a second extension 15
 of said base. A bore 16 extends from said recess 13
 substantially perpendicular thereto within said base to a
 shoulder 17 where a second bore 18 of a relatively small
 diameter extends concentric with said first bore.

A pair of bores 19 each extend into said support on an
 opposite side of bore 16 at substantially right angles there-
 to. Said support further has a base 20 with recessed side
 21 connected by a circular opening 22.

A jaw 23 of substantially an L configuration has a
 bottom recess 24 providing arms 25 and 26 which are
 substantially parallel and spaced apart for receiving the
 recessed portion 21 of base 20 therebetween with openings
 27 extending through said arms with a pin 28 extending
 through openings 27 and 22 which pivotally connect said
 jaw to said support base.

Jaw 23 has a straight side 29 with an inwardly taper-
 ing cam surface 30 extending towards the axis of said jaw
 while the base 31 has a curved recessed surface 32 capable
 of encompassing a portion of the periphery of a tube.
 The top 33 of said jaw base extends substantially at right
 angles to the front side 34 which is substantially straight
 and said top 33 and side 34 are thus of a configuration and
 are positioned for mating with the side 35 and top 14 of
 the support 10 which side 35 is substantially straight and
 extends at substantially right angles to the flat top 37
 of base 20 and extends down to the flat bottom 38 of
 said base forming one of the sides of the recessed portion
 21 of base 20, while the second sides 36 of said recessed
 portion 21 extend substantially parallel to the sides 35 and
 are spaced apart to allow jaw 23 a limited pivoting action
 away from side 35 before the side 29 of said jaw contacts
 the sides 36 of said base and also the bottom 24 of said
 jaw encases the top 37 of said base.

Base 20 is detachably connected to table C by a plu-
 rality of bolts 39.

A pair of bores 40 and 41 are formed in jaw 23 and
 positioned for coinciding with openings 19 in said support
 when said jaw has side 34 contacting side 35 of the support
 with a pair of springs 42 and 43 positioned in openings
 19—40 and 19—41 respectively tending to move said jaw
 away from said support to the position shown in FIG. 1
 of the drawings until stopped by the walls 36 and top 37
 of said base. Said walls 36 are spaced from wall 35 to
 limit the pivoting of jaw 23 to the position of FIG. 1
 placing cam surface 30 of said jaw beneath and in line
 with the inclined surface 8 of cam 4.

The punching press to be used with the present tube
 support and clamp may be of any known and conventional
 type having a plunger A which is driven in reciprocation
 to and from a table C by a mechanism (not shown) and
 the present elements 4 and 10 may be connected to existing
 presses or assembled during the production of new presses
 by means of the bolts 6 and 39 extending through the

plunger A and the table C and being in threaded engagement with the base 5 or the table C respectively as indicated in the drawings by way of an example only. It is to be appreciated that the bolts may equally as well be in threaded engagement with the plunger A or the base 20.

The cam 4 is connected to the plunger A with its upright 7 extending substantially parallel to the punch 3 and with the bevelled face 8 slightly to the left of cam face 30 of jaw 23 as viewed in FIG. 1.

Base 20 of the support is mounted upon the table C with the bores 16 and 18 forming a die button hole in line with the axis of punch 3 while the recessed surface 13 of said support extends substantially at right angles to bore 16 for supporting a section of a tube D at substantially right angles to the axis of said punch.

With the present tube support and clamp mounted and connected to the punch press, a tube D is placed in recessed surface 13 whereupon the punching press is placed in operation causing plunger A to move downwardly being guided by guide B towards the table C. Inclined surface 8 of cam 4 driven by said plunger will engage and slide along the cam surface 30 of jaw 23 pivoting said jaw until the recessed surface 32 thereof engages the periphery of tube D pressing the same into recess 13 where it is retained by the leg 7 of said cam sliding along the rear face 29 of said jaw.

As soon as this clamping action has taken place, the punch 3 whose end is slightly above end 9 of said cam will also engage the periphery of tube D in the space provided between the base 31 of jaw 23 and the projection 11 of support 10. Continued downward movement of plunger A will cause punch 3 to pass through the wall of tube D at diametrically opposite points forming an opening there-through and continue into bore 16. The punch is thereafter withdrawn from tube D by the return stroke of plunger A which also withdraws cam 4 from jaw 23. As soon as said cam disengages jaw 23, springs 42 and 43 cause jaw 23 to move away from tube D releasing the tube which is still supported by a recessed surface 13 but can be slid therealong or withdrawn therefrom as desired.

The aforementioned operation is repeated upon each reciprocation of plunger A with the result that the tube can receive a series of punched openings rapidly and the support and clamping of the tube during each punching operation is entirely automatic with the result that the operator has merely to slide the tube along support 10 to the proper section of the tubing to receive each opening there-through as required.

The present device is capable of considerable modifica-

tion, and such changes thereto as come within the scope of the appended claim are deemed to be parts of the present invention.

I claim:

A machine for punching holes through tubing comprising a table, an upright base fixedly mounted on said table and having a top end and a straight side, said base top end having a recess extending thereacross with one side of said recess being shorter than the other side giving a J-shaped cross-sectional configuration to said recess for supporting a portion of a tube therein and further having a flat end extending between the shorter side of said recess and said base straight side, said base further having an opening extending from within said recess of said base top end towards said table, a jaw having one end pivotally connected to said base below said base flat end for being pivoted to and from said base side, said jaw having an intermediate portion of a configuration for mating with said base side and flat end when pivoted against said base side and a laterally extending opposite end portion with a side recess positioned for extending contiguous with said base top end recess shorter side when said jaw mates with said base, but spaced from said base top end recess longer side retaining said tube in said top end recess, resilient means extending between said base and said jaw tending to pivot said jaw from said base, said jaw further having a side wall with a cam surface on a side thereof opposite to said side recess, a punch carrying plunger positioned above said base top and moveable to and from said base for inserting said punch between said base top recess longer side and said jaw side recess into said base opening, means for reciprocating said plunger, a cam carried by said plunger for movement therewith in advance of said punch and positioned for engaging said jaw cam surface for pivoting said jaw into its mating position with said base and said jaw side recess into its tube retaining position whereby said punch can thereafter punch a hole through said tube and enter said base opening and be withdrawn therefrom.

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