April 24, 1928. 1,667,387

D. C. KINNEAR

METAL DRAWING APPARATUS

Filed May 14, 1927 3 Sheets-Sheet 1

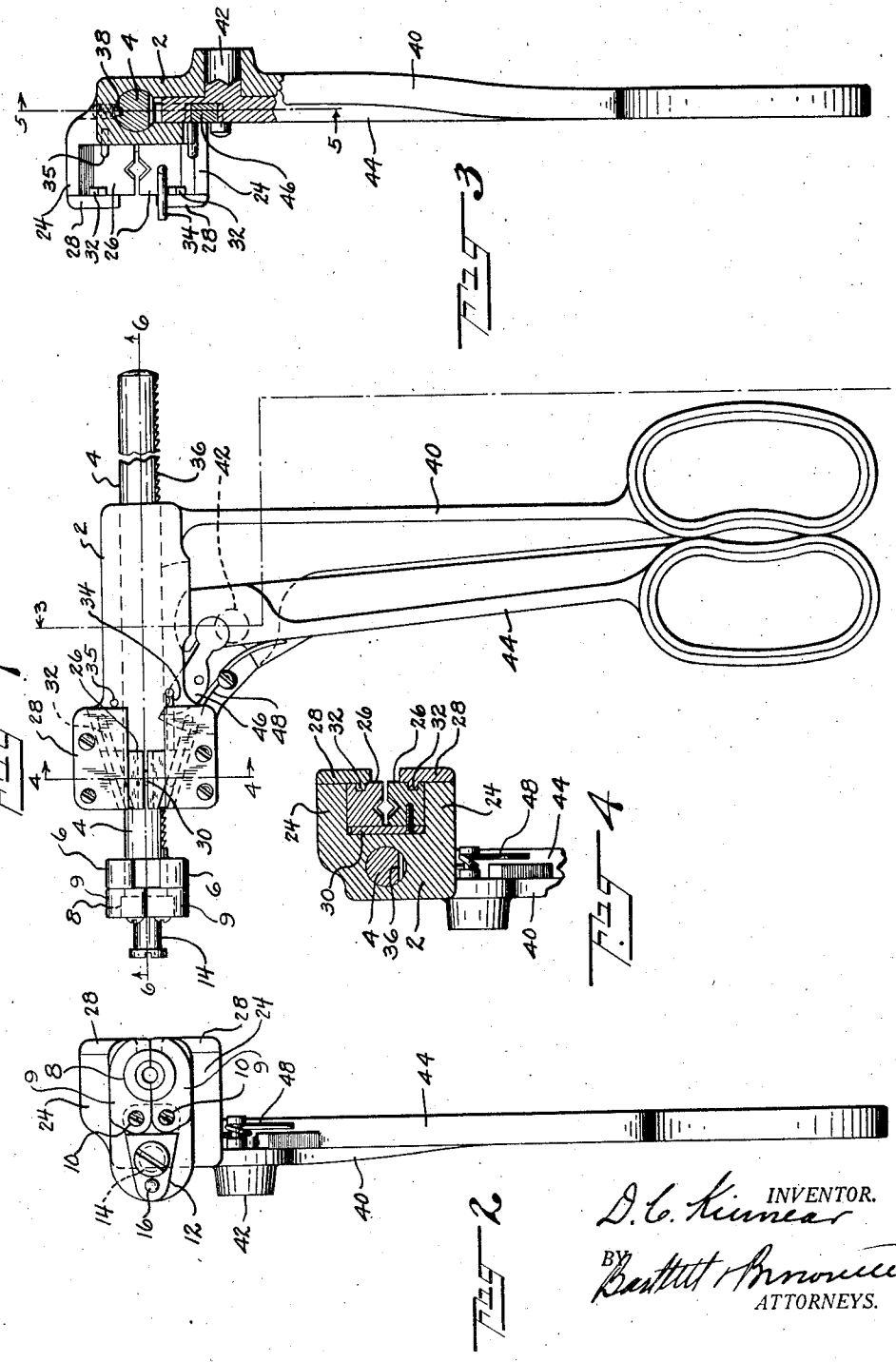


Fig. 3

Fig. 1

Fig. 4

Fig. 2

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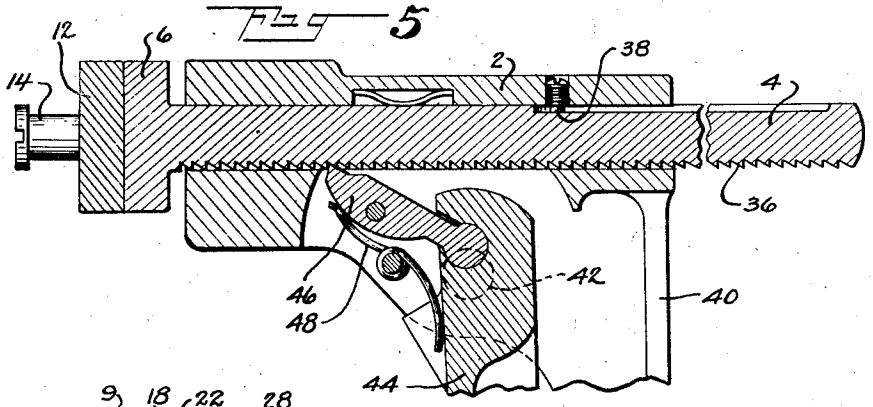
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D. C. KINNEAR

METAL DRAWING APPARATUS

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Fig 5



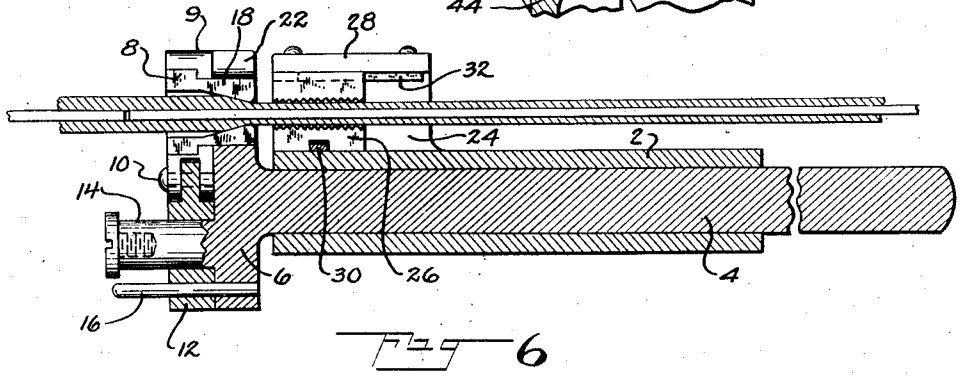




Fig 6

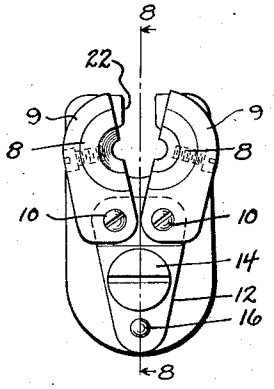



Fig 7

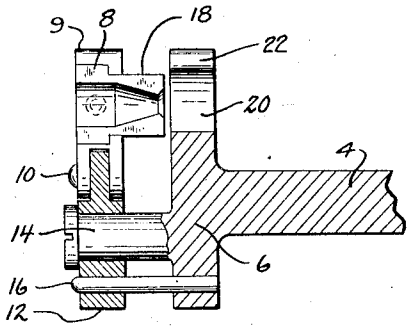



Fig 8

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D. C. KINNEAR

METAL DRAWING APPARATUS

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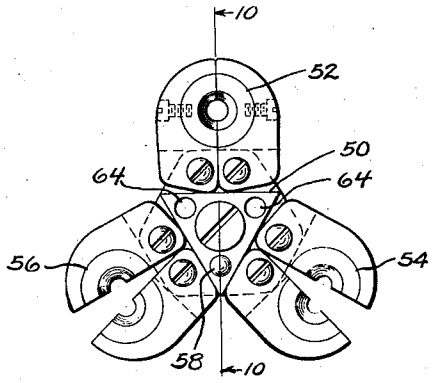



Fig 9

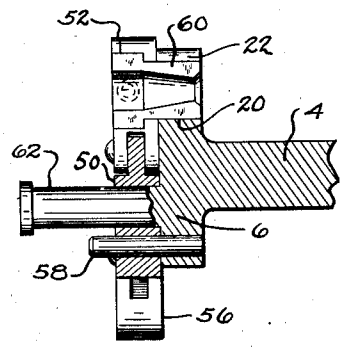



Fig 10

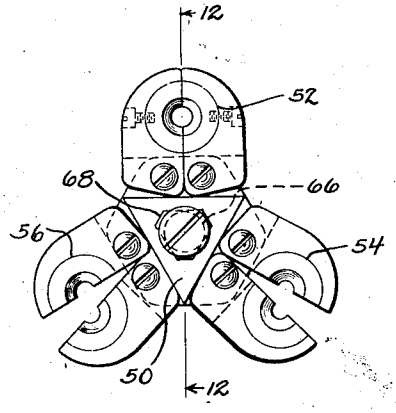



Fig 11

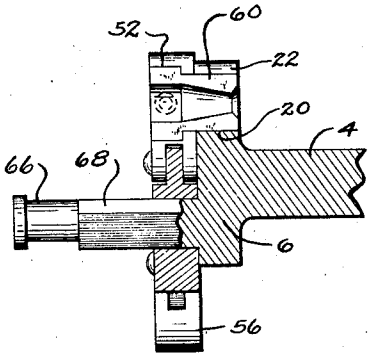



Fig 12

D. C. Kinnear, INVENTOR.

BY Bartlett Brownell.

ATTORNEYS.

Patented Apr. 24, 1928. 1,667,387

# UNITED STATES PATENT OFFICE.

DELAMAR C. KINNEAR, OF WATERBURY, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AMERICAN BRASS COMPANY, OF WATERBURY, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## METAL-DRAWING APPARATUS.

Application filed May 14, 1927. Serial No. 191,522.

My invention relates to metal drawing apparatus and has for its object to provide a new and improved drawing apparatus. It further has for its object to provide a drawing apparatus having a split drawing die the parts of which are permanently connected to said apparatus. It further has for its object to provide a new and improved wedging clamp for holding a portion of the work to be drawn. It further has for its object to provide an apparatus having a plurality of split drawing dies coacting with a die holder and permanently connected to the apparatus so that any one of the drawing dies can be introduced into the die holder. It further has for its object a hand operated drawing tool having any one or all of the above features.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of a hand operated tool embodying my invention;

Fig. 2 is an end elevation of the same;

Fig. 3 is a section on the line 3—3, Fig. 1;

Fig. 4 is a section on the line 4—4, Fig. 1;

Fig. 5 is a section on the line 5—5, Fig. 3;

Fig. 6 is a section on the line 6—6, Fig. 1;

Fig. 7 is an end elevation of the dies and die holder, together with the supporting and alining means;

Fig. 8 is a section of the same on the line 8—8, Fig. 7;

Fig. 9 shows a modified form of carrier and three pairs of die parts carried thereby;

Fig. 10 is a section on the line 10—10, Fig. 9;

Fig. 11 shows a construction similar to that of Fig. 9, with different alining means substituted; and

Fig. 12 is a section on the line 12—12, Fig. 11.

Referring more particularly to the drawings, 2 is a support for a slide 4 carried thereby and having a die holder or socket 6 for a two-part drawing die 8. The two parts of this drawing die are secured by screws to arms 9 pivotally connected at 10—10 to a die carrier 12 which is mounted to slide upon a bearing 14 carried by the die holder so that it can be moved toward or from the die holder. This carrier, as it approaches the die holder, is alined relatively to the die holder by a pin 16 carried by the die holder. The portions of the die have rearward extensions 18 which, when the die is closed and the carrier is moved toward the die holder, enter the recess 20 in the die holder. This die holder is open at one side as shown at 22 so that when the die carrier is retracted and the die is opened, a wire, tubing or the like can be introduced into the opened die through the opening 22. After the wire, tubing or the like is so introduced, the die is closed and the carrier 8 is moved toward the die holder until the projections 18 enter the recess 20, whereupon the two parts of the die are held in drawing position.

Mounted upon the support 2 or integrally formed therewith are the sides 24 of a holder for clamping jaws 26. These jaws are held between the sides 24 by plates 28 secured to said sides 24. The inner surfaces of the sides 24 are inclined toward one another in the direction of the die holder 6 and the jaws 26 have external sides inclined toward one another and engaging the inclined surfaces of said sides 24. One of the jaws 26 has secured to it the plate 30 projecting transversely and sliding within a transverse groove in the other jaw 26 so as to maintain the inner faces of the jaws parallel to one another. The plates 28 have on their inner surfaces longitudinally extending projections 32 which slide in the grooves in the outer faces of the jaw members, said grooves being inclined toward one another and parallel to the inner surfaces of the side walls 24 so that when the jaws are retracted they are caused to separate and when they are moved in the direction of the die holder are permitted to approach one another under the influences of the inclined sides 24 and clamp between them a wire, tubing or the like, which may be placed between them. One of the jaw members is provided with a projecting handle 34 by which it can be moved in one direction or the other as desired. A stop pin 35 is provided to limit the backward movement of the jaws.

The slide 4 is provided with ratchet teeth 36, and, if cylindrical, is provided with a longitudinal slot into which extends a pin 38 for holding it against rotation while permit-

ting longitudinal movement. Integral with the support 2 is a hand grip handle 40 and pivoted to said support at 42 is a movable handle 44 to which is pivotally connected a pawl 46 which is normally held in engagement with the rack 36 by a spring 48. As the handle 44 is oscillated relatively to the handle 40, the pawl engaging successive teeth on the ratchet 36 causes the slide to move the die holder away from the clamp, this being more fully described in my earlier application Serial No. 177,529, filed March 23, 1927, on the apparatus of which the present invention constitutes an improvement.

With the construction described there is no danger of dropping either of the die members and the die members are easy to manipulate, which is particularly desirable in cold weather. Furthermore, the clamp does not require any clamping screw, the clamping action being automatic after the jaws have been brought into contact with the member to be clamped. Furthermore, the wire or tubing can be laid directly between the split die portions and the jaws of the clamp, on account of the opening 22 and the opening between the plates 28.

It is oftentimes desirable to have at hand a plurality of dies of different sizes or to have a plurality of dies of the same size, which can be replaced one for another in case a set of dies becomes worn. In order to accomplish this end I provide a special form of carrier 50, shown in Fig. 10, to which parts of three split dies 52, 54 and 56 are pivotally connected, these dies being of the same size or different sizes as desired. With this form of carrier the alining pin is made shorter, as shown at 58, so that when the carrier is advanced sufficiently to withdraw the rearwardly extending portions 60 from the die holder, the carrier, together with the dies, can be revolved about the bearing 62 so as to bring any one of the three dies opposite the opening in the die holder. The carrier is provided with three holes 64 into any one of which the guide pin 58 can enter, these holes being so positioned that when the pin 58 is within any one of them one of the pairs of split dies is properly alined so that when closed its rearwardly extending parts can be moved into the recess in the die holder.

In the form shown in Figs. 11 and 12 the bearing 66 for the carrier is provided with an angular surface 68 whose sides are tangential with the cylindrical portion of the bearing and adapted to engage the sides of a corresponding opening in the die carrier, and act to aline it so as to aline any one of the dies opposite the opening in the die holder. Aside from this alining feature, the construction is substantially the same as that of Figs. 9 and 10.

In operating the tool, the carrier is moved so as to withdraw the die from the die holder, permitting it to open and the jaws 26 are retracted to open position, the slide 4 being retracted so as to bring the die holder 6 up to the jaw holder carried by the support 2. The object to be drawn is then placed between both the separated die members and the separated jaw members and the carrier is moved toward the die holder, the die being closed, until the rearward extensions on the die members are within the recess in the die holder. The jaws of the clamp are then closed and the handle 44 is then actuated so as to cause the pawl 46 to propel the slide 4 and move the die holder, together with the die, away from the support 2 with its clamp, this action being continued until the desired drawing operation is effected.

The tool is specially adapted for drawing a tubular member placed upon the two ends of a wire or cable so as to couple the two ends together. When the tool has been operated long enough to move the dies beyond the end of the tubular member, the coupled wire can be easily removed from the dies and clamp, which are in that operation restored to initial position, so that after the slide is retracted the apparatus is ready to receive and act upon another tubular member.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a split die the two parts of which have extensions adapted to enter said die holder, a carrier to which said parts are pivoted, and means carried by said die holder along which said carrier is slidable toward and from said die holder.

2. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a split die the two parts of which have extensions adapted to enter said die holder, a carrier to which said parts are pivoted, means carried by said die holder along which said carrier is slidable toward and from said die holder, and means for alining said carrier so as to aline said die with the die holder when said die is closed and moved toward said die holder.

3. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a plurality of split dies each die having two parts provided with extensions adapted to enter said die holder, a carrier to which said parts are pivoted, a bearing carried by said die holder about which said carrier is rotatable and along which it is slidable to permit the in-

troduction and withdrawal of the extensions on any pair of die sections into or out of said die holder.

4. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a plurality of split dies, each die having two parts provided with extensions adapted to enter said die holder, a carrier to which said parts are pivoted, a bearing carried by said die holder about which said carrier is rotatable and along which it is slidable to permit the introduction and withdrawal of the extensions on any pair of die sections into or out of said die holder, and indexing means engaging said carrier for holding any of said dies when closed in line with said holder when moved toward said holder.

5. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a plurality of split dies, each die having two parts provided with extensions adapted to enter said die holder, a carrier to which said parts are pivoted, a bearing carried by said die holder about which said carrier is rotatable and along which it is slidable to permit the introduction and withdrawal of the extensions of any pair of dies into or out of said die holder, and indexing means engaging said carrier for holding any of said dies when closed in line with said holder when moved toward said holder, said indexing means comprising surfaces out of alinement with the axis of said bearing.

6. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a clamp having jaws separable along a plane passing through the opening in the side of said die holder, and a jaw holder having an opening located in said plane.

7. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a clamp having jaws separable along a plane passing through the opening in the side of said die holder, a jaw holder having an opening located in said plane, said jaw holder and jaws having angularly disposed surfaces, and means for holding the opposed faces of said jaws parallel during the opening and closing movements of said jaws.

8. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a clamp having jaws separable along a plane passing through the opening in the side of said die holder, and a jaw holder having an opening located in said plane, said jaws and jaw holder having angularly disposed guiding surfaces converging toward said die holder acting to separate said jaws when said jaws are retracted.

9. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a clamp having jaws separable along a plane passing through the opening in the side of said die holder, means for maintaining the opposing faces of said jaws parallel and opposite to one another, a jaw holder having an opening located in said plane, said jaws and jaw holder having angularly disposed guiding surfaces converging toward said die holder acting to separate said jaws when said jaws are retracted, and a handle connected to one jaw for retracting said jaw.

10. A drawing apparatus comprising a clamp, an open sided die holder, means for moving said die holder away from said clamp, in combination with a plurality of split dies, each die having two parts provided with extensions adapted to enter said die holder, a carrier to which said parts are pivoted, a bearing carried by said die holder about which said carrier is rotatable and along which it is slidable to permit the introduction and withdrawal of any of said extensions into or out of said die holder, an indexing pin engaging said carrier for holding any of said dies when closed in line with said holder when moved toward said holder, said indexing pin being carried by said die holder and located eccentrically to said bearing.

In testimony whereof, I have signed my name to this specification this 11th day of May, 1927.

DELAMAR C. KINNEAR.