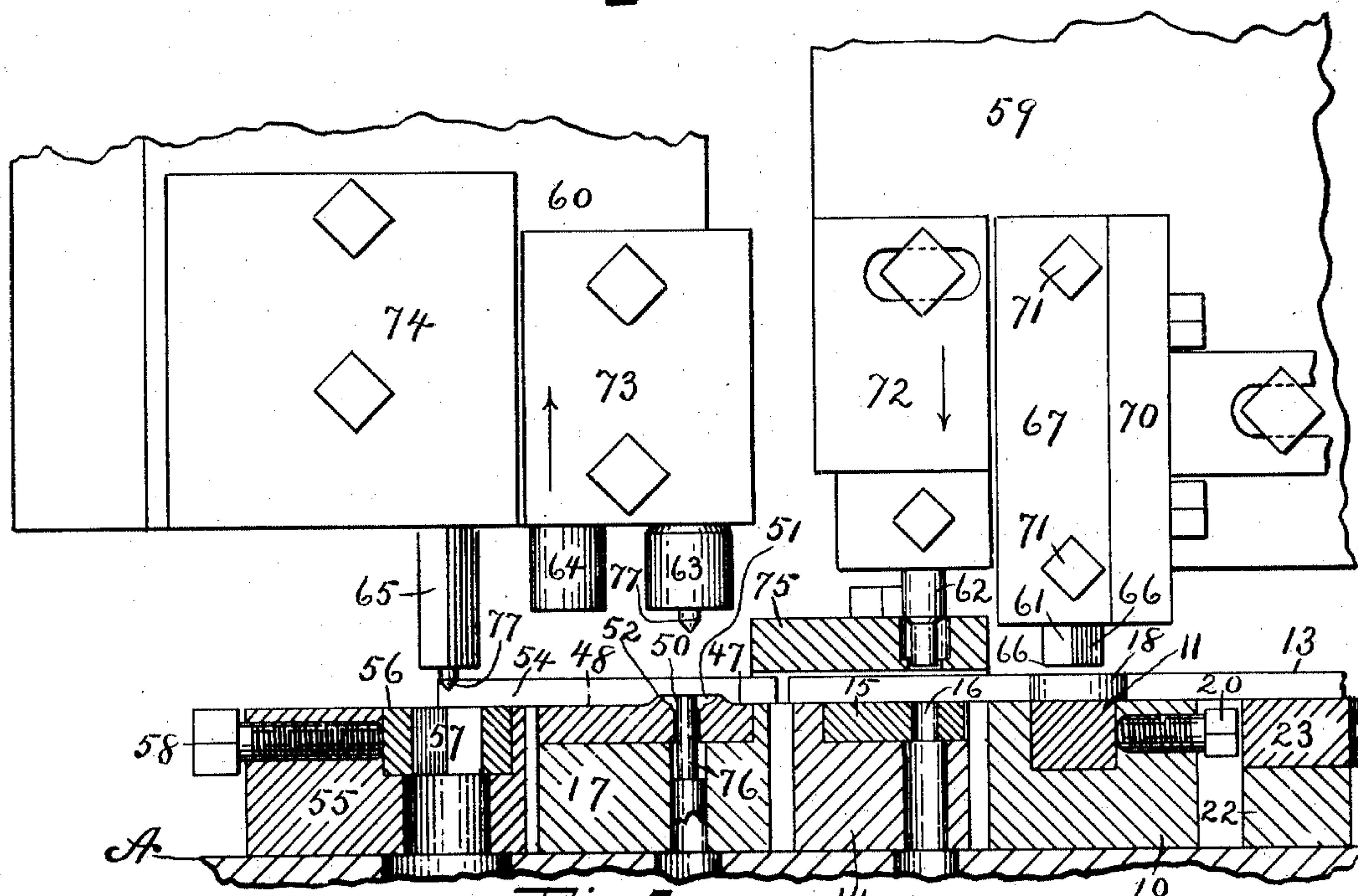


DIES AND PUNCHES FOR MAKING NUTS.
APPLICATION FILED JUNE 9, 1908.

Patented July 20, 1909.

2 SHEETS—SHEET 1.



Witnesses.

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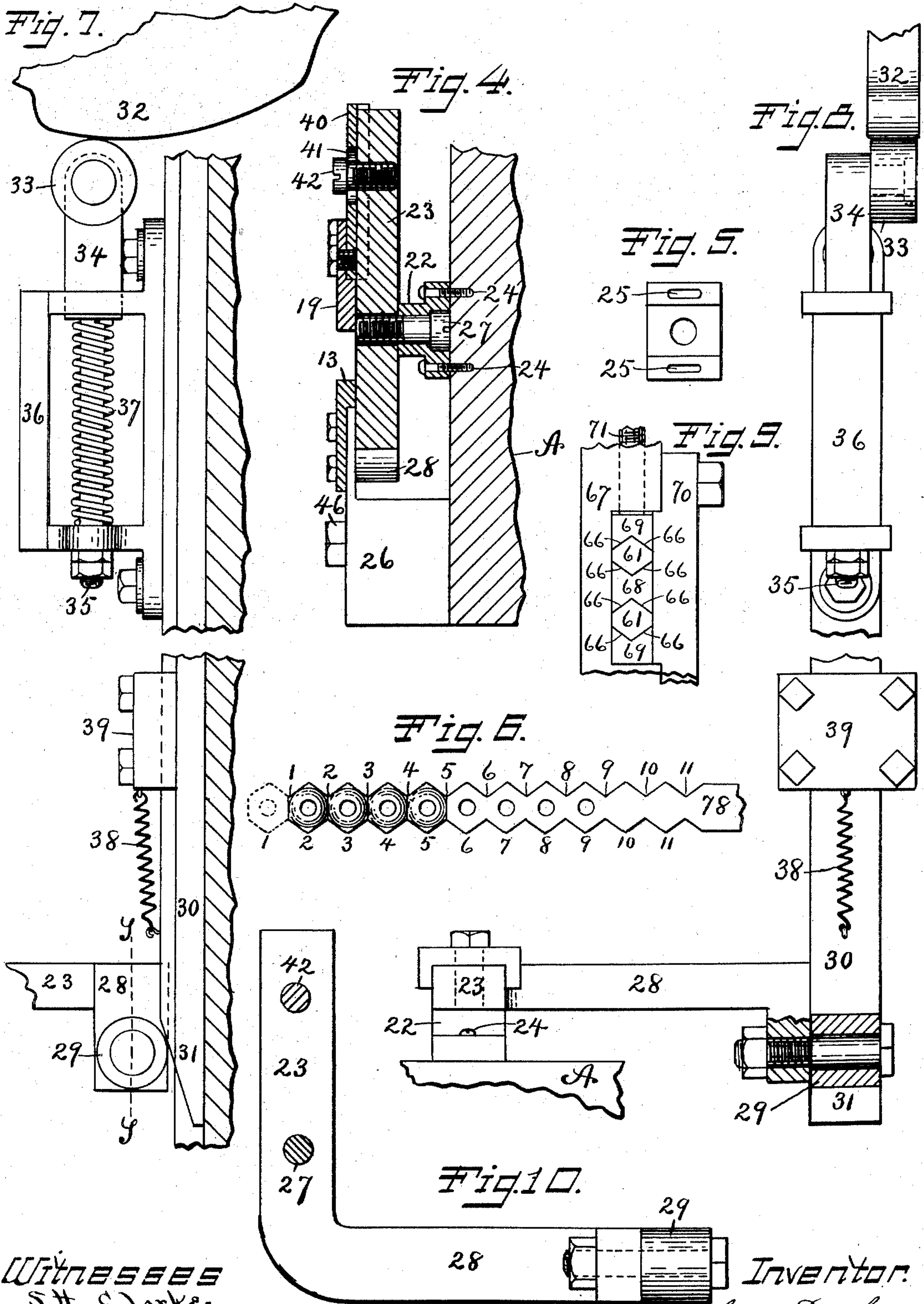
Wm James Shepard. Atty.

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2 SHEETS—SHEET 2.



WITNESSES
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UNITED STATES PATENT OFFICE.

GEORGE DUNHAM, OF UNIONVILLE, CONNECTICUT.

DIES AND PUNCHES FOR MAKING NUTS.

No. 928,509.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE DUNHAM, a citizen of the United States, residing at Unionville, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Dies and Punches for Making Nuts, of which the following is a specification.

My invention relates to improvements in dies and punches for making nuts and the special object of my improvement is to construct and combine the dies and punches with special reference to their use in an automatic machine, whereby efficiency in operation is effected and good work is produced at a small cost.

In the accompanying drawing:—Figure 1 is a face view of the several dies as viewed from the rear of the machine. Fig. 2 is a plan view of the punches with a horizontal section of the dies, the front of the machine being at the bottom and consequently the right hand die as shown in Fig. 2 is shown at the left in Fig. 1. Fig. 3 is an enlarged face view of the swaging die in a slightly modified form as compared with Figs. 1 and 2. Fig. 4 is a vertical section of the die bed and connected parts on the line *xx* of Fig. 1, the said view being on the same scale as Figs. 1 and 2. Fig. 5 is a front view of the adjustable block upon which the gage lever is pivoted. Fig. 6 is a face view of a bar of metal illustrating the operation of the several dies thereon. Fig. 7 is a broken out side elevation of the gage lever operating mechanism, together with a vertical section of a portion of the bed of the machine. Fig. 8 is a broken out plan view of the parts shown in Fig. 7, less the bed of the machine, the friction roller of the gage lever and an adjacent portion of the gage lever being shown in horizontal section on the line *yy* of Fig. 7. Fig. 9 is a face view of the punch or punches for the notching dies. Fig. 10 is a front elevation of the swinging gage lever with a sectional view of its pivotal screw 27, and cap holding screw 42.

Dies and punches for making nuts are commonly used in machines that are substantially the same as a power press having sometimes only one crank and one punch slide, and sometimes two cranks and two punch slides, and generally they are arranged so that the slide or slides move horizontally.

My dies and punches as shown are adapted

for an ordinary double crank machine having two horizontally moving punch slides.

The present invention relates to the dies and punches, in connection with which I employ a new gage.

A designates a die bed to which the several die holders are secured in any proper manner. The die holder 10 is provided with a die 11 having two V shaped cutting edges 12 with the apices of the said edges facing each other and arranged on a line that extends transversely to the lower gage 13 for gaging one edge of the bar from which the nuts are to be made. I prefer to secure the said gage rigidly to a block 26 having a vertical slot 45 through which a bolt 46 extends to the die bed A, whereby the gage may be adjusted vertically. This die acts to cut V shape notches in the opposite edges of the bar and hence it is designated as the notching die. It may be fitted to and held within its holder in any proper manner. As shown it is held within the recessed holder by means of a set screw 20. Adjacent to the die holder 10 is the die holder 14 which is a die block 15 having a round hole 16 for punching the central hole of the nut blanks in the bar. The edge of the lower gage 13 extends from in front of the notching to or a little beyond the die block 15, but its edge is provided with a notch or recess 18 adjacent to the notching die to permit the notching punch to pass therethrough. The die holder is provided with holes 21 to carry off the scrap. The opposite edge of the bar in passing by the dies so far described is gaged and the bar clamped edgewise by means of an opposing movable gage 19, acting in connection with the lower gage 13.

On the die bed at the right of the notching dies, when standing in front of the machine, and at the left of the notching die as shown in Fig. 1, a pivotal block 22 for the gage lever is adjustably mounted so as to be adjusted toward and from the said notching die. Any suitable and ordinary construction may be employed for adjusting this block as for example securing it to the die bed by means of screws 24 that pass through slots 25, Fig. 5, in the said block. This pivotal block is perforated and the gage lever pivoted thereon by means of a screw 27 that passes through the said block and into the said lever. The said gage lever comprises vertical and horizontal arms, the vertical arm 23

being the one by which the completed lever is pivoted, while 28 designates its horizontal arm. This horizontal arm extends toward the right hand side of the machine and carries a friction roller 29 at its end. A slide 30 having a wedge 31, at its end is arranged to move longitudinally on the main bed or frame B of the machine with its wedge under the said roller. The slide is moved toward the friction roller on the gage lever by means of a cam 32 preferably on the main shaft of the machine. Instead of having the said cam act directly on the said slide, I prefer to have the cam act on a friction roller 33 that is mounted on the head 34 of a yielding bolt 35. This bolt is slidably mounted in a frame 36 that is rigidly secured to the said slide and is provided with a stout spring 37, one end of which bears on the head 34 of the said bolt while its other end bears on the frame 36. If everything is in proper working order the slide 30 is moved longitudinally by the cam 32 the same as if the said friction roller was mounted directly on the slide, but in case the movement of the slide is blocked, the yielding mechanism hereinbefore described for connecting the friction roller with the said slide enables the bolt on which the said roller is mounted to move forward without any movement of the slide and hence any damage to the machine is avoided. The slide is moved in the direction to release the wedge 31 from the roller 29 by means of a spring 38, that is connected by one end to the said slide and by its other end to the fixed cap 39, through which the slide moves. The movement of the wedge under the end of the horizontal arm 28 of the gage lever forces the said arm upwardly thereby rocking the upper end of the vertical arm 23 of the said lever swinging it toward one side in the direction to carry the clamping gage 19 downwardly against the notched upper edge of the bar and thereby clamp the bar edgewise between the gages 19 and 13. When the wedge is withdrawn from under the friction roller of the gage lever the movable gage is released so as to release the bar. I prefer to adjustably mount the movable gage on the upper end of the gage lever and as shown I do so by rigidly securing the said gage 19 to an adjustable cap 40 having a slot 41 through which a screw 42 may pass into the vertical arm 23 of the gage lever so that the said block and attached gage may be moved up or down and secured in their adjusted position by tightening up the said screw. The said gage lever also operates what I call a combined clamping and centering or spacing gage 43. This gage 43 is mounted on the movable gage 19 so as to become a part thereof and swing up and down from and toward the notched edge of the bar with its lower end in position to engage the said

notched edge and bear upon two of the oppositely beveled inclines thereof. It is immaterial whether it acts on two opposing sides of one nut blank or upon the opposing sides of two different nut blanks. The shape of its end is immaterial so long as it bears on two such opposing faces. As shown the lower or acting end 44 of the said gage is pointed and beveled so as to bear on the opposite inclines of one V shaped notch in the bar, and consequently on the sides of two different nut blanks. The effect of this is to force the bar properly against the opposing gage 13 and also to move the bar slightly in the direction of its length so as to bring a nut blank centrally over the round hole die 16 for punching the hole in the center of the said blank. Of course the bar must be momentarily free to move longitudinally when this gage acts on the bar.

The notched bar passes the punching die holder 14 to the third die holder 17 in which there is a crowning die 47 and a flattening die 48, the same being preferably formed in one piece or die block 47. The crowning die has a central hole 50 therethrough and a concave face 51 surrounding the said hole and concentric therewith, the said concave face being formed in a projection 52 that stands out beyond the face of the die at each end thereof, as best shown in Fig. 2. In order to show the best way to form such a die I have shown in Fig. 3 a slight modification thereof and in which 47^a designates the crowning die which has the same central hole 50 as in Figs. 1 and 2. The centers of the two adjoining nut blanks are laid out on the opposite sides of this central hole at proper distances therefrom. If desired these centers may be defined by other round holes 50^a. By means of a suitable sweep or milling tool the concave face 51 for the die proper is formed and then a similar concave face on either side thereof concentrically to the other round holes or the centers thereof, as indicated by the semi-concavities 51^a. The face of the die block is then planed off up to the centers of the holes 50^a on each side of the concave face 51 and to the depth of the concavity. If desired, the greater part of the semi-concavities may be planed off leaving the projection 52 with but little more than one concavity in it, as shown in Figs. 1 and 2. The adjacent concavities are so large, or so near each other, that they run together and meet in lines that extend transversely across the die in parallel lines, as shown at the lines 53 in Fig. 3. Any suitable or ordinary edge gages 54 may be secured above and below the dies 47 and 48. The said gages may also extend partly across the fourth and last die holder 55 in which the round die block 56 of the trimming or cutting off die 57, is held by means of a set screw 58. The punches for these respective dies are carried in the two

slides 59 and 60 of the machine, the right hand slide 59 carrying the two notching punches 61 and the round hole punch 62, while the left hand slide carries the crowning punch 63, flattening punch 64, and trimming or cutting off punch 65. As shown, the two notching punches are hexagonal so as to present four cutting edges 66. These are let into a recess in their holder 67 in connection with three filling blocks, the middle filling block 68 being recessed on two sides to fit the confronting sides of the punches 61, while the end filling blocks 69 are recessed to fit the opposite sides of the said punches. These punches and blocks are held in place in the die holder 67 by a cap 70 and set screws 71. The middle filling block is of a width to hold the said punches the proper distance apart to act on the two V shaped cutting edges 12 of the notching die 11.

While each notching punch has four cutting edges only two of these edges on each punch can be used at one time. It is thus immaterial whether or not the said punches have more than two cutting edges each. They are provided with four edges so they may be reversed to bring two fresh cutting edges into action when desired. The respective punch holders 72, 73 and 74 for the round hole punch 62, the crowning and flattening punches 63 and 64, and the trimming punch 65 are or may be of any ordinary construction and require no further description. The die for the round hole should of course be provided with some suitable picker or take off 75 to pull the bar off from the round hole punch 62 as the said punch recedes from the die 16. I desire also to employ an ordinary spring actuated knock out 76 within the central hole of the crowning die, to eject the bar of metal from the said die but no novelty is claimed for the knock-out of itself. The crowning punch 63 and the trimming punch 65 may be provided each with an ordinary pilot or centering pin 77.

The two slides 59 and 60 move forward together toward the dies with the left hand slide 60 a little in advance of the right hand slide 59. The bar 78, Fig. 6, is fed into the machine from the right toward the left, so as to pass between the several dies and punches and their gages. After the bar has been acted upon by all of the dies and punches, all that portion of the bar so acted upon has a series of V shaped notches in its opposite edges, which notches I have numbered from 1 to 11, inclusive at the upper edge of the bar. I have also numbered the nut blanks in like manner at the lower edge of the bar. The ordinary feed of the bar stops and releases the bar when the left hand slide 60 is about to present the pilot 77 of the trimming punch 65 to the round hole in the nut blank marked 1 and shown in broken

lines as on the end of the bar. This pilot controls the position of the bar as the nut is trimmed and severed from the bar. The pilot 77 of the crowning punch next engages the nut blank marked 5, and controls the position of the bar for crowning the said blank and at the same time flattening the blank marked 3. When these three operations have been performed the left hand slide 60 recedes and withdraws its punches and about the time that the pilot of the punch 63 releases the bar the slide and wedge 30 and 31 act to move the gage clamp lever so as to bring the end 44 of the movable gage 43 into one of the upper notches of the bar 78, and bearing on the opposing beveled or inclined edges of the bar brings the said bar into the proper position relatively to its length to center a nut blank on the bar properly over the notching and round hole dies 11 and 16. At the same time this gage 43—44 presses the bar toward the opposing edge gage 13 with a tendency to center the bar relatively to its width. That part of the movable gage 19 that projects from the gage 43 to the right in Fig. 1, is especially designed for use in making square or other shaped nuts without notching the bar, and therefore when notching dies are employed for making hexagonal, octagonal, round or other form of nuts on a notched bar I prefer to arrange the end 44 of the gage 43, relatively to the lower edge of the projecting part of the gage 19 so that the end 44 shall do all, or substantially all the work, the said lower edge of the projecting part of the gage 19, having little or no clamping pressure on the upper edge of the bar. With the bar thus held, the left hand slide 60 continues to recede while the right hand slide 59 continues to advance as shown in Fig. 2, and as indicated therein by the respective darts. The respective dies and punches for this slide then notch the bar at the notches marked 11 and form the round hole in the nut blank marked 9, after which the right hand slide begins to recede and then both slides recede together until near the end of their stroke. About the time that the picker or take off frees the bar from the round hole punch 62, the cam 32 releases the gage lever and the feed takes hold of the bar to feed it forward a distance equal to the width of one nut blank, and the several operations are repeated.

The flattening die and punch act to level the nut blank, which is desirable, as a bur is liable to be formed by the round hole die and punch adjacent to the said hole on that side of the blank which faces the die. The flattening die and punch although desirable, are not essential. The nut blank marked 1, in Fig. 6, is cut off and trimmed, the blank marked 5 crowned and the blank marked 3, flattened at one blow of the left hand slide.

The notches marked 11 and the round hole in the nut blank marked 9 are made at one blow of the right hand slide. It may be noted that one blow of each of the two slides cuts the notches marked 11, punches the round hole in the nut blank marked 9, crowns the nut blank marked 5, flattens the nut blank marked 3, and severs and trims the nut blank marked 1. The next blow of the two slides will form one more pair of notches and perform the succeeding operations on the nut blanks marked 10, 6, 4 and 2, respectively.

If the die Fig. 3, were employed the operation would be the same only instead of crowning the whole face of one nut blank at one stroke of the crowning punch, a half face of two adjoining nut blanks would be crowned at one blow. This is because the bar is fed only a distance equal to one nut blank so that only the width of one nut blank can be swaged or crowned no matter how much of the bar the crowning die covers. The crowning die must be above the general surface of the die block in which it is formed on that side at which the bar is presented thereto so that the uncrowned portion of the bar may move toward the face of the die block without obstruction when the face that is crowned is forced into the concavity of the crowning die.

It is evident that any desired form of nut that would result in waste pieces at the edges of a straight bar of metal which pieces might be cut out by means of notching dies and punches, may be made with my dies by merely changing the shape of the notching and trimming dies and punches, while square nuts may be made by merely omitting the notching punches, that portion of the movable gage which enters the notches in the bar, and substituting a trimming die and punch of a square form for the hexagonal form herein shown. I may also note that for clamping the bar edgewise and releasing it, two gages acting on the opposite edges of the bar are necessary, but it is immaterial whether or not one gage is fixed so long as one of the two gages is movable.

It is apparent that some changes from the specific construction herein disclosed may be made and therefore I do not wish to be understood as limiting myself to the precise form of construction shown and described, but desire the liberty to make such changes, in working my invention, as may fairly come within the spirit and scope of the same.

I claim as my invention:—

1. In a set of dies and punches for making nuts from a bar of metal, a crowning die

having an elevated portion projecting beyond the adjacent face of the die on that side to which the said bar is presented, and a concavity sunk within the said elevated portion, the said concavity having doubly beveled edges that extend transversely to the said die in parallel lines on two opposite sides of the said concavity, and a crowning punch having a face for pressing on one side of the said bar to force its opposite side into the said concavity.

2. In a set of dies and punches for making nuts from a bar of metal, the combination of notching dies and punches for notching the opposite side of the bar for the respective nut blanks thereon with a gage for one edge of the said bar, an opposing movable gage having faces for engaging two oppositely inclined edges of the notched portion at the opposite edge of the said bar, and a round hole die and punch for punching the central hole of the said nut blanks, the said dies being relatively located to each other and to the said gages to have the latter bring the bar into the proper position over the said notching dies and over the round hole die.

3. In a set of dies and punches for making nuts from a bar of metal, the combination of notching dies and punches for making notches in the opposite edges of the said bar, with a gage for one edge of the bar, and an opposing gage arranged to move to and from the opposite edge of the bar at the notched portion thereof, the said gage having faces for engaging two oppositely inclined edges of the notched portion of the bar to bring the bar into the proper position over the said notching dies.

4. In a set of dies and punches for making nuts from a bar of metal, the combination of notching dies and punches for making notches in the opposite edges of the said bar with a gage for one edge of the said bar, an opposing gage arranged to move to and from to and from the opposite edge of the bar at the notched portion thereof, the said gage having faces for engaging two oppositely inclined edges of the notched portion of the bar to bring the bar into proper position over the said notching dies, a swinging angle lever upon which the said movable gage is mounted, a wedge shaped slide for engaging one arm of the said angle lever, a cam for operating the said slide, and a yielding mechanism mounted on the said slide for the said cam to act upon.

GEORGE DUNHAM.

Witnesses:

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