Dec. 7, 1954 D. T. THEODORE 2,696,013

NAIL PRODUCING DIE-SET FOR PUNCH PRESSES

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Fig. 2.

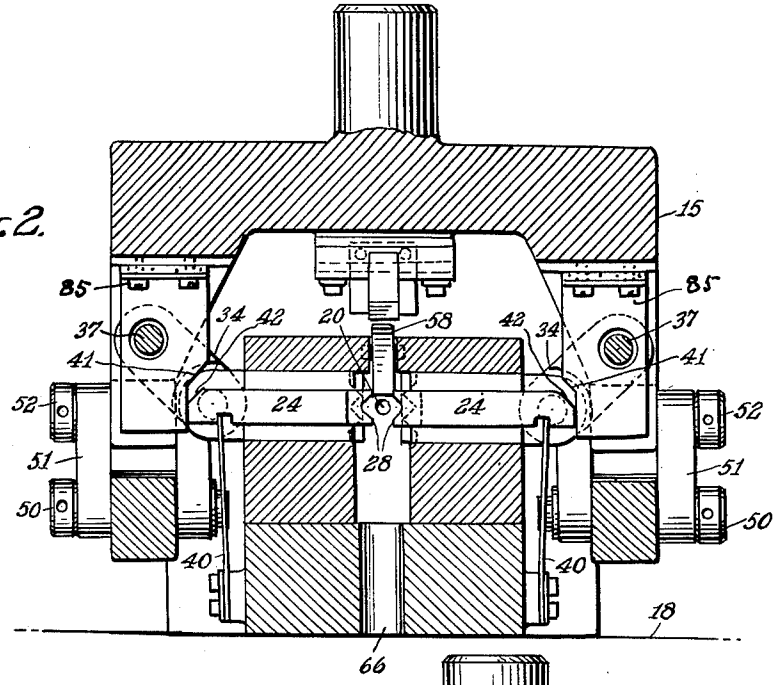
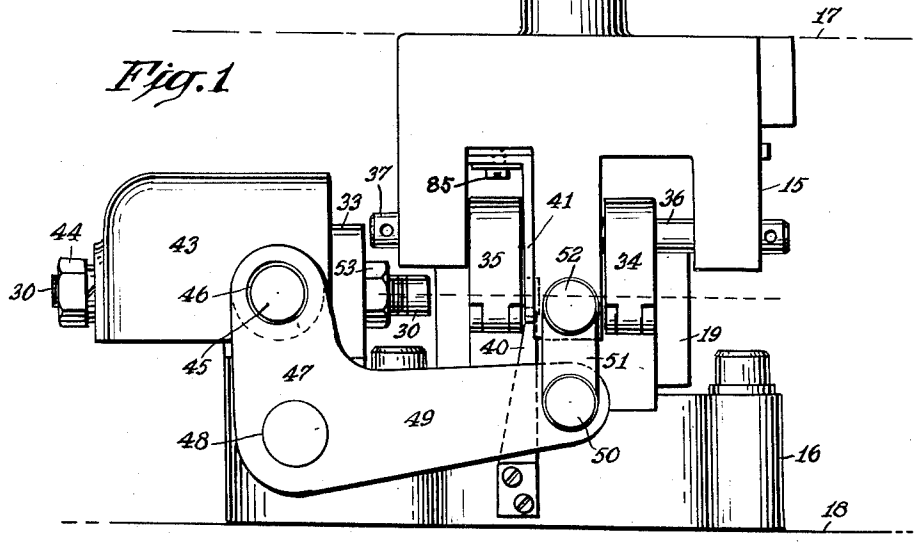


Fig. 1.



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Fig. 4.

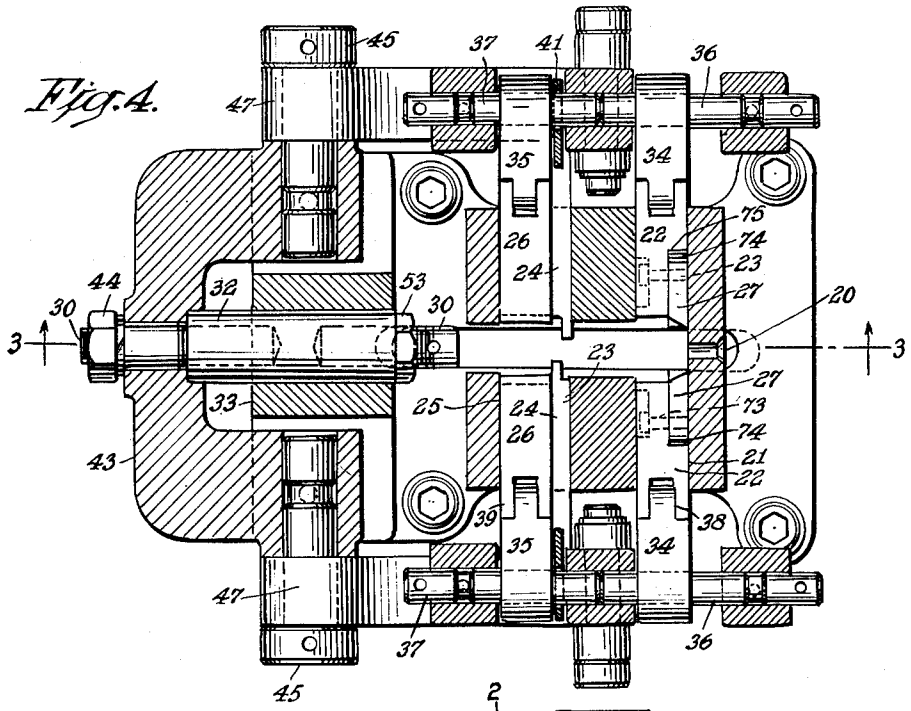
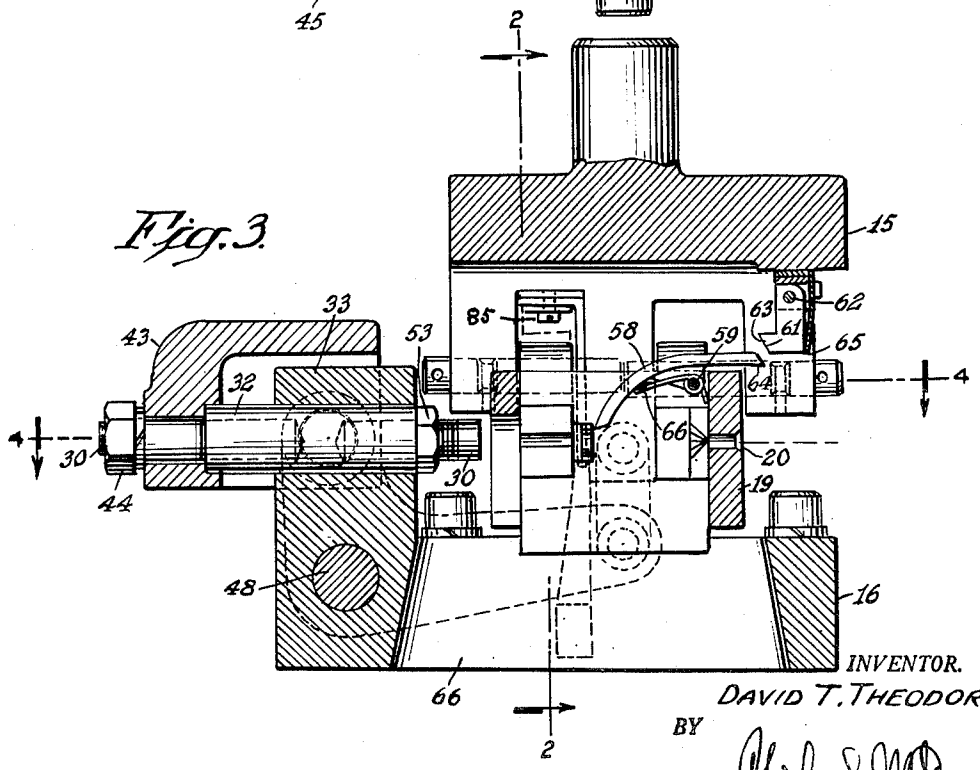


Fig. 3.



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Fig. 5.

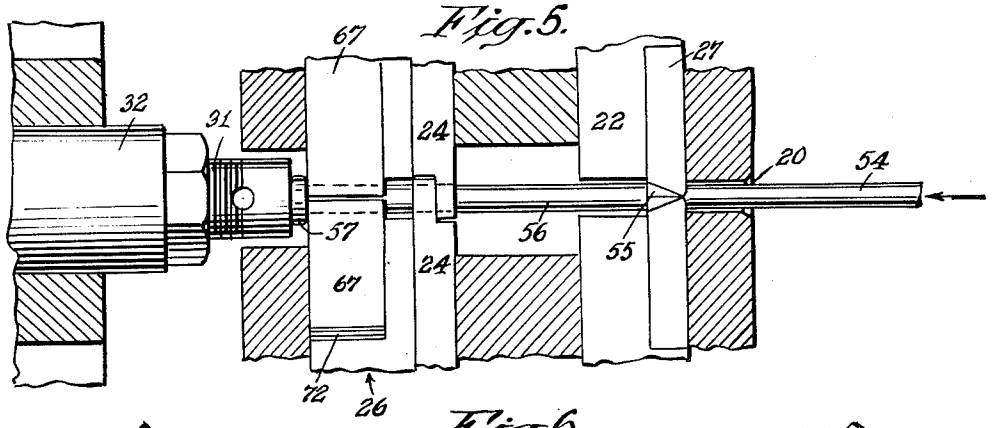


Fig. 6.

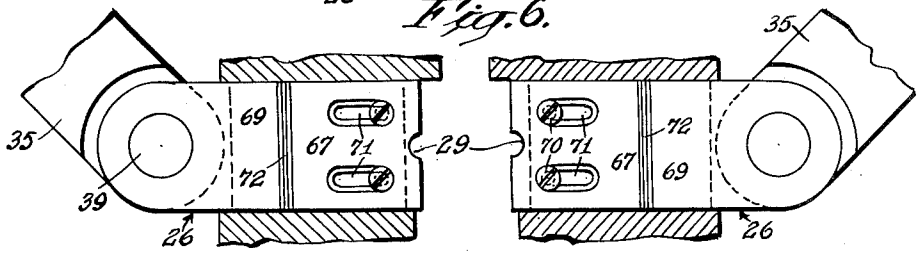


Fig. 7.

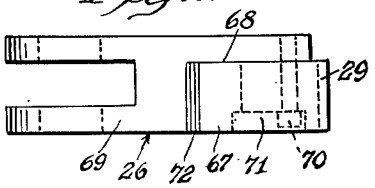


Fig. 8.

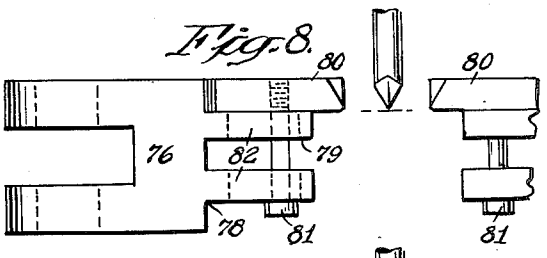


Fig. 9.

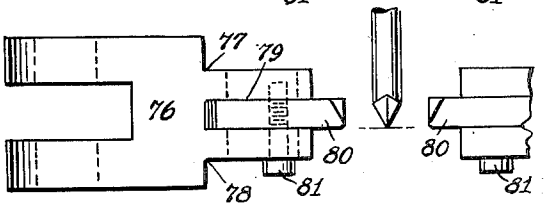
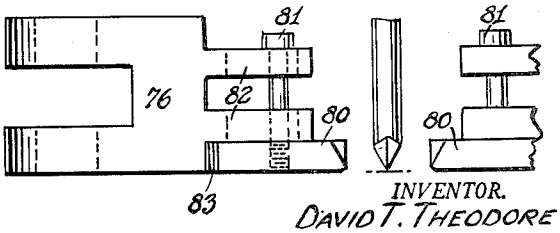


Fig. 10.



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2,696,013

NAIL PRODUCING DIE-SET FOR PUNCH PRESSES

David T. Theodore, Elmhurst, N. Y.

Application August 9, 1951, Serial No. 241,099

3 Claims. (Cl. 10—50)

The invention disclosed herein relates to the manufacture of wire nails and is a continuation-in-part of the invention disclosed in copending application for patent, Serial No. 65,321, filed December 15, 1948, and issued as Patent No. 2,564,739 on August 21, 1951.

Objects of the present invention are to improve the basic concept, particularly in effecting alignment of the wire preparatory to operation of the dies, to provide more powerful action of the dies and to enable adjustment of the die mechanism for different nail sizes and for wear and the like.

Special objects of the invention are to accomplish these results in a simple, rugged, compact form of mechanism which will be readily applicable to power presses or machines of like character and which will be entirely practical and efficient for the purposes intended.

Further special objects of the invention are to provide die mechanism of the character indicated which will consist of but relatively few, simple parts which can be produced at low cost and which can be readily assembled, disassembled and adjusted, as required.

The foregoing and other desirable objects are attained by certain novel features of construction, combinations and relations of parts, all as set forth in the following specification and broadly covered in the claims.

The drawings accompanying and forming part of the specification illustrate a present commercial embodiment of the invention. Structure, however, may be modified and changed as regards the immediate disclosure, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a side elevation of the die assembly, as it is mounted in the punch press or like machine;

Fig. 2 is a vertical, transverse, cross-sectional view of the same on substantially the plane of line 2—2 of Fig. 3;

Fig. 3 is a broken longitudinal sectional view as on substantially the plane of line 3—3 of Fig. 4;

Fig. 4 is a horizontal sectional view on substantially the plane of line 4—4 of Fig. 3;

Fig. 5 is an enlarged broken sectional view illustrating the cooperative relation of the cutters, centering guides, grippers and header;

Fig. 6 is a broken part sectional view of the gripper dies;

Fig. 7 is a plan view of the left-hand gripper die shown in Fig. 6;

Figs. 8, 9 and 10 are broken plan views of the cut-off and pointing dies as arranged for different nail lengths.

As shown in Fig. 1, the invention comprises upper and lower members 15 and 16 designed for direct attachment to the ram and bolster elements of the power press or secured to top and bottom plates arranged for attachment to the ram and bolster portions of a press. The lines shown at 17 and 18 may be considered as indicating either the ram and bolster or the top and bottom plates referred to.

Mounted on the lower or base member 16 is a housing block 19 for centering the wire stock and for guiding and supporting the cut-off, centering and gripper slides.

In Figs. 3 and 4 the housing member is shown as carrying a wire centering guide 20 at the right-hand wire-entering end of the same.

At the inner side of this wire guide the housing member has a transverse guideway 21 for the opposed, companion cut-off slides 22.

At a further advanced point in the housing member, a transverse guideway 23 is provided for the opposed, companion wire centering slides 24 and, adjoining that,

a transverse guideway 25 for the opposed, companion gripper slides 26.

The cut-off slides 22 carry dies 27 for cutting and pointing the wire into nail ends. The centering slides 24 have companion jaws 28, Fig. 2, at their inner ends for centering the wire, and the gripper jaws 26 have companion jaw elements 29, Fig. 6, to positively grip and hold the cut wire against the blow of the longitudinally acting header 30.

The header element 30 is shown as having a longitudinally adjustable screw mounting 31 in the cylindrical slide or plunger 32 operating in the upstanding guide portion 33 of the base.

The slides described are operated in the base member 16 through leverage and cam connections from the upper member 15, designed to effect the necessary timing and power as follows:

Heavy, quick acting power for the cut-off and gripper slides is provided through the medium of toggle acting connections in the form of toggle links 34 and 35 from the upper member to the cut-off slides 22 and gripper slides 26, respectively.

These toggle links, as shown in Figs. 1 and 4, are pivotally mounted at their upper ends on pivot studs 36, 37, carried by the upper or head block 15, and are pivotally connected at their lower ends to the slides by the knuckle joints 38 and 39.

The wire centering guides 24 are shown in Fig. 2 as retracted by flat springs 40 and as closed into guiding engagement with the wire by inclined cams 41 dependent from the upper head, in position to engage the inclined outer ends 42 of these slides.

The header slide 32 is shown as actuated by a yoke 43 secured over the outer end of said slide and the projecting end of the header (30) by nut 44, Fig. 3, said yoke carrying pivot studs 45 at opposite sides of the central guide 33, engaged at 46, Fig. 1, by the shorter arms 47 of bell cranks journaled on the base at 48 and having longer arms, 49, to which are pivotally connected at 50, links 51 pivotally connected with the upper head at 52.

The pivotal connections at 46 between the short arms and the bell cranks of the yoke are shown in Fig. 1 as loose enough to allow for the variation in centers between the bell cranks and the horizontally operating header slide.

The nut 44 at the outer screw threaded end of the header stud 30, and the nut 53 on the inner screw threaded end of this stud serve to secure the stud in properly adjusted relation in the surrounding tubular slide 32 and to fasten this slide and stud firmly in place in the actuating yoke 43.

Suitable wire feed and straightening means may be employed for intermittently advancing the wire stock to the dies, for example such as illustrated in the basic patent above identified.

Fig. 5 indicates in general the basic operation, wherein the wire stock 54 directed through the wire guide 20, is severed and pointed at 55 in a nail length 56 which previously has been centered by the guides 24 for the solid, holding engagement of the gripper dies 26 while being upset at 57 by the header 30.

These parts usually are timed for the guides 24 to enter and lightly restrain the stock while the cutting and pointing dies are operating, at approximately which time the gripper dies close to hold the cut length as an anvil for the action of the header.

To effect positive discharge of the finished nail, an ejector lever 58 is shown pivoted at 59 on the housing block, centrally over the nail position, Fig. 2, yieldingly supported by the spring 60 in the upper position shown in Fig. 3, and designed to be rocked downwardly by the hook 61 pivoted at 62 on the upper die member. This hook is shown as having an inclined face 63 to slide downwardly over the oppositely inclined outer end 64 of the ejector, on the down stroke of the press head, a wire or flat spring such as shown at 65 permitting the hook to rock outwardly and to engage beneath the end of the ejector lever in such downward movement of the press head.

On the upward movement of the press head the

trigger hook will pick up and rock the outer end of the ejector lever upwardly, thereby to cause the inner end of this lever to snap the finished nail, in case it remains in place, downwardly, clear of the die mechanism and out through the discharge slot **66** in the base member.

The dies may be made as integral portions of the slides or as separate inserts adjustably mounted on the slides.

Thus Figs. 5, 6 and 7 show the grippers **26** specifically as die blocks **67** adjustably secured in side recesses **68** in the slide forming elements **69** by screws **70**. The slots **71** in the die blocks through which these screws pass, permit longitudinal adjustment of these die blocks on the slide carriers and shims **72** inserted in the recesses in back of the die blocks definitely determine the adjusted relation of the die blocks on the slide carriers.

The cutting and pointing slides and dies may be similarly constructed or otherwise made to provide for changes in size of stock, length of nail and the like.

In Fig. 4 the cutting and pointing dies **27** are indicated as adjustably secured by screws **73** and shims **74** in shouldered recesses **75** in the sides of the slide carriers or slide bodies **22**. These elements may be square in cross-section so that they may be turned over, side-for-side, to enable the dies being located and operated at the opposite sides of the slides, thus to cut a nail length shorter, to the extent of the width of the slide.

Hence with the construction shown in Fig. 4, the cutter slides may be employed to cut two different lengths of nails.

Figs. 8, 9 and 10 illustrate a form of construction adaptable for cutting three different lengths of nails.

In the latter instance the cutter slides **76** are made with die seats **77**, **78**, on opposite sides and with a center seat **79**, and the dies **80**, secured in either of these relations by screws **81**, are made of a size to fit in either of the side seats **77**, **78**, or in the center seat **79**, as illustrated in the different views.

Slots **82** provided for the screws and shims **83**, provide for the adjustable mounting of the die blocks, as heretofore described in connection with the gripper slides and die blocks.

The construction described provides ready assembly and the taking apart or adjustment of parts for wear or change of nail size.

Most of the parts are relatively small and inexpensive to make.

The toggle and bell crank operations described provide ample power with quick action, and hence a high production rate.

The complete mechanism is small and compact and readily adaptable to or removable from an ordinary power press or like machine.

Shims or other means may be provided for adjustment of the toggle links, or these links may be made up of longitudinally adjustable screw sections to provide for adjustment of length, and hence operative effect of these links.

The toggles for actuating the cross slides and the bell cranks for longitudinally actuating the header slide provide quiet, quick acting, powerful means for effecting properly timed action of these related devices. The toggles, operating in opposite directions at opposite sides of the ram, balance out side pressure and reduce friction to a minimum. These parts are all easily lubricated.

The opening action of the opposed cross slides may be assisted by springs and it is contemplated that in place of the half toggles shown, the slides may be actuated by double ended toggles made up in each instance of a pair of pivotally connected toggle links, actuated from the ram by links engaged with the connecting pivots.

The cams **41** which actuate the centering guides **24** may be adjustably mounted on the upper member to take up for wear and to adapt them to different size wire stock as by having the screws **85** which secure them to this member pass through slots in the mounting base portions of such cams, as will be clear from Figs. 1, 2 and 3.

What is claimed is:

1. A nail producing die-set for use on a punch press or the like comprising upper and lower companion die members attachable respectively to the ram and bolster elements of a punch press or the like, a wire centering guide at one end of the lower die member for longitudinally guiding nail forming wire stock, opposed transversely operating wire cutting slides at the inner side of said wire centering guide, a longitudinally operating header mounted on the lower die member at the opposite end of the same, transversely operating gripper slides mounted on the lower die member at the inner side of said header, transversely operating cooperative wire centering guides mounted on the lower die member at the inner side of said gripper slides and operable independently of the gripper slides and cutter slides, springs for retracting said wire centering guides, cams on the upper die member for imparting cooperative closing movement to said opposed wire centering guides at commencement of the down stroke of the upper die member, toggle links connected between said upper die member and cutter slides for actuating said cutter slides while the wire stock is engaged by said cooperating centering guides, toggle links connected between said upper die member and gripper slides for closing the latter on the length of wire stock severed by the cutter slides and centered by the centering guides, a yoke connected with said header and arched around to opposite sides of the same, bellcranks pivoted on the opposite sides of the lower die member and connected with the portions of the yoke arched around to the opposite sides of the header and operating connections from the upper die member to said bellcranks for effecting operation of said header after the closing action of said gripper slides.

2. A nail producing die-set for use on a punch press or the like comprising upper and lower companion die members attachable respectively to the ram and bolster elements of a punch press or the like, a wire centering guide at one end of the lower die member for longitudinally guiding nail forming wire stock, opposed transversely operating wire cutting slides at the inner side of said wire centering guide, a longitudinally operating header mounted on the lower die member at the opposite end of the same, transversely operating gripper slides mounted on the lower die member at the inner side of said header, transversely operating cooperative wire centering guides mounted on the lower die member at the inner side of said gripper slides and operable independently of the gripper slides and cutter slides, means for advancing said wire centering guides into wire centering relation at commencement of the down stroke of the upper die member, toggle links connected between said upper die member and cutter slides for actuating said cutter slides while the wire stock is engaged by said cooperating centering guides, toggle links connected between said upper die member and gripper slides for closing the latter on the length of wire stock severed by the cutter slides and centered by the centering guides, a yoke connected with said header and arched around to opposite sides of the same, bellcranks pivoted on the opposite sides of the lower die member and connected with the portions of the yoke arched around to the opposite sides of the header and operating connections from the upper die member to said bellcranks for effecting operation of said header after the closing action of said gripper slides.

3. The method of manufacturing wire nails which comprises first, advancing wire nail stock an approximate nail length, second, engaging and loosely holding the advanced nail length of wire at a mid-length point in a definitely centered relation, third, cutting and pointing the advanced length of wire while holding the same loosely enough to permit creep of the wire from the cutting off and pointing action, fourth, tightly gripping the severed nail length at a point adjacent the advanced front end of the same while loosely holding it in the fully advanced and centered relation, fifth, heading the extreme front end of the cut and pointed nail length while tightly gripping the same and then after heading, releasing and ejecting the completed nail.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
333,417	King	Dec. 29, 1885
1,025,016	Parfitt	Apr. 30, 1912
1,144,297	Chaplin	June 22, 1915
1,442,989	Alexander	Jan. 23, 1923
1,766,484	Clouse	June 24, 1930
2,564,739	Theodore	Aug. 21, 1951