May 12, 1931. W. KOWAL 1,805,336

BLANK FEEDING MECHANISM FOR PUNCH PRESSES

Filed Aug. 14, 1929 6 Sheets-Sheet 1

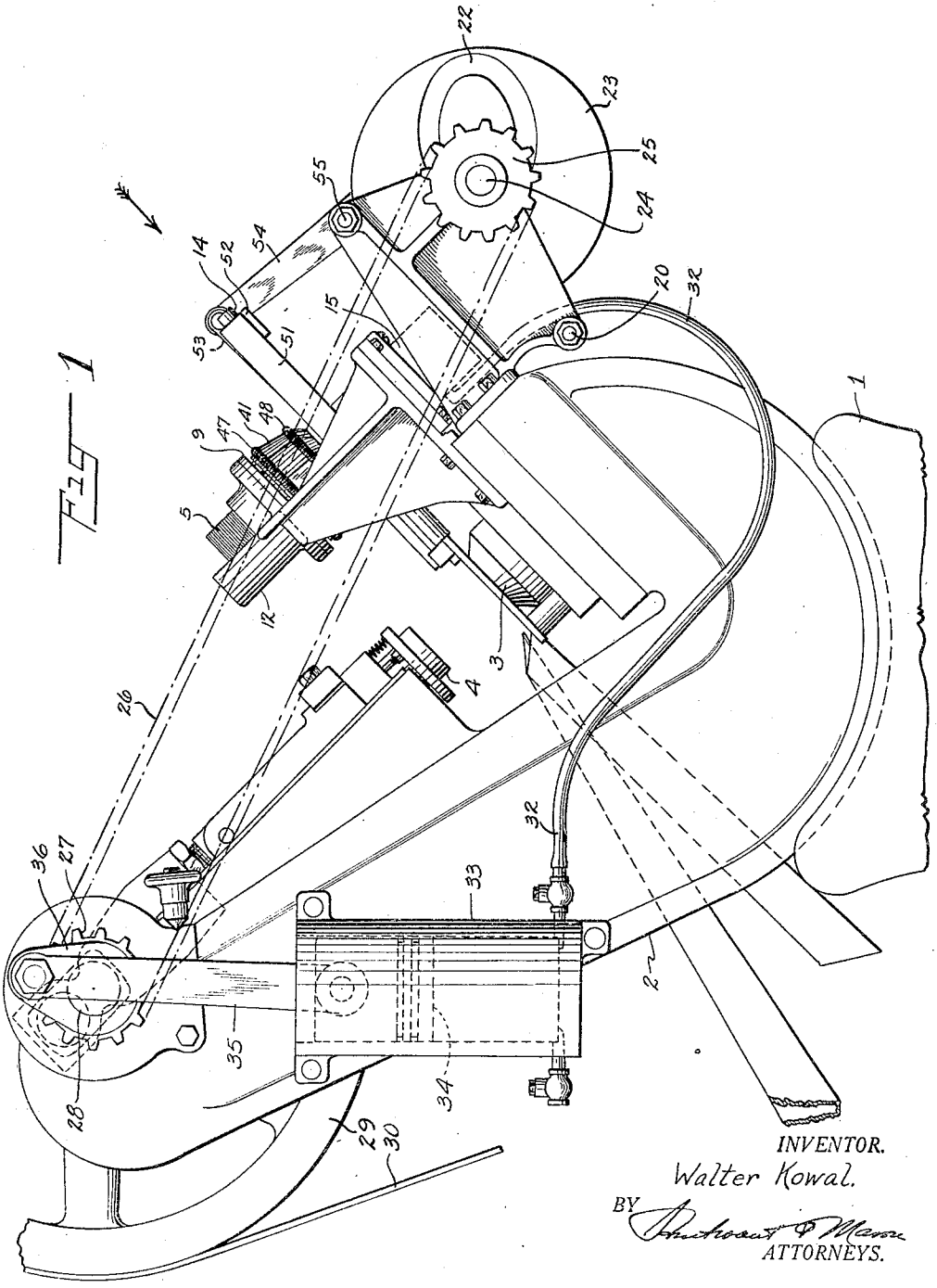


Fig. 1

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BLANK FEEDING MECHANISM FOR PUNCH PRESSES

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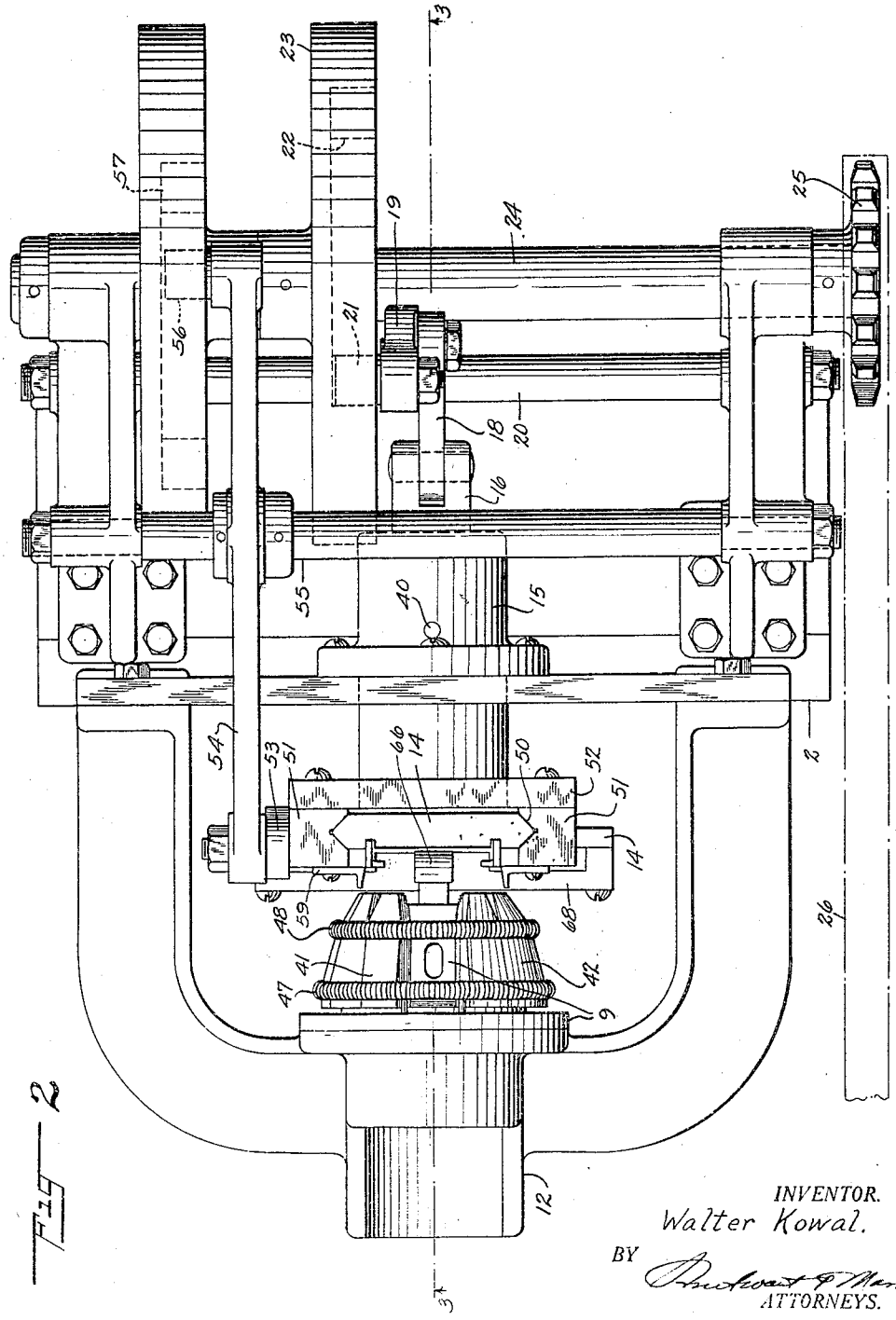


Fig. 2

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BLANK FEEDING MECHANISM FOR PUNCH PRESSES

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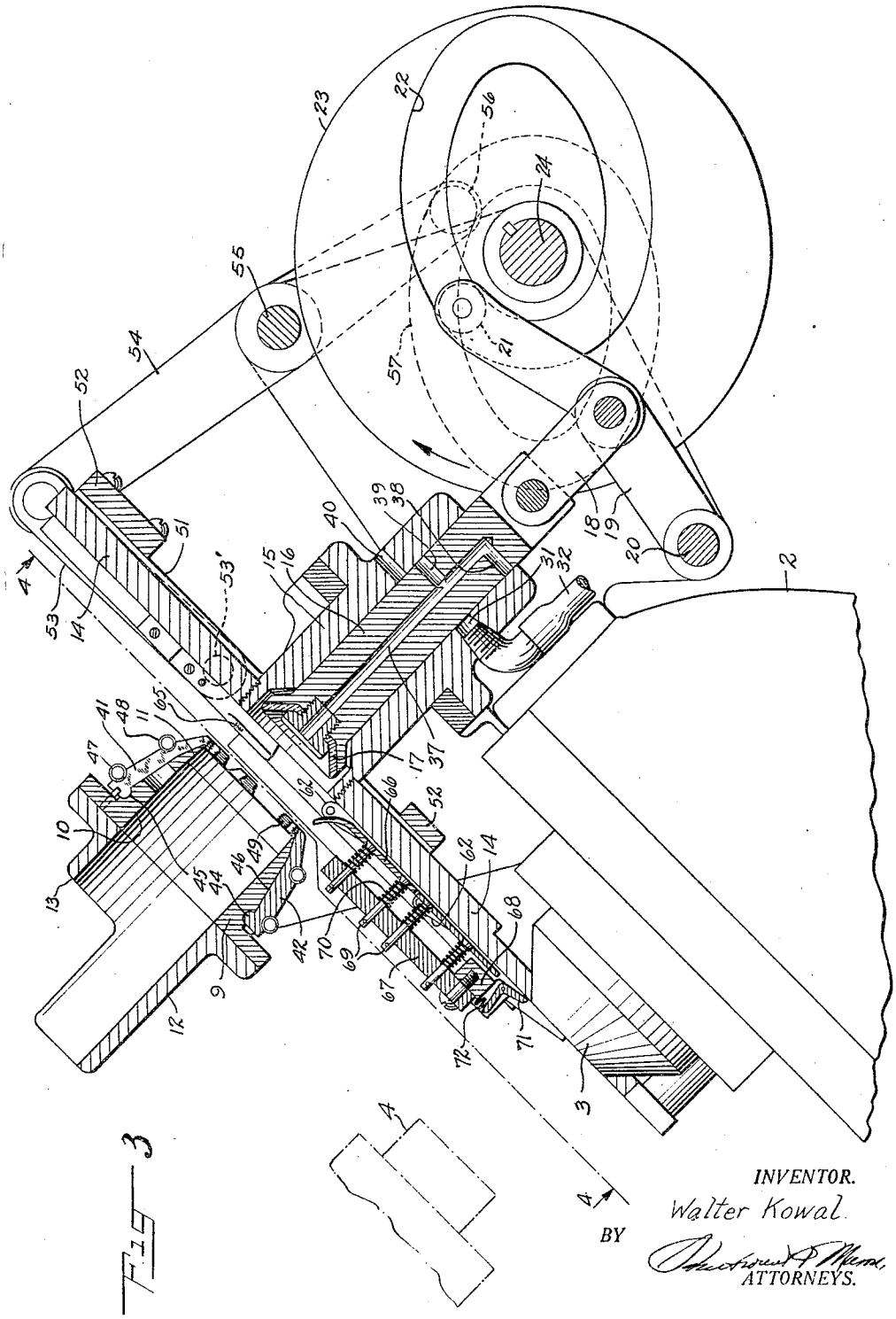


Fig. 3

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May 12, 1931. W. KOWAL 1,805,336

BLANK FEEDING MECHANISM FOR PUNCH PRESSES

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Fig 4

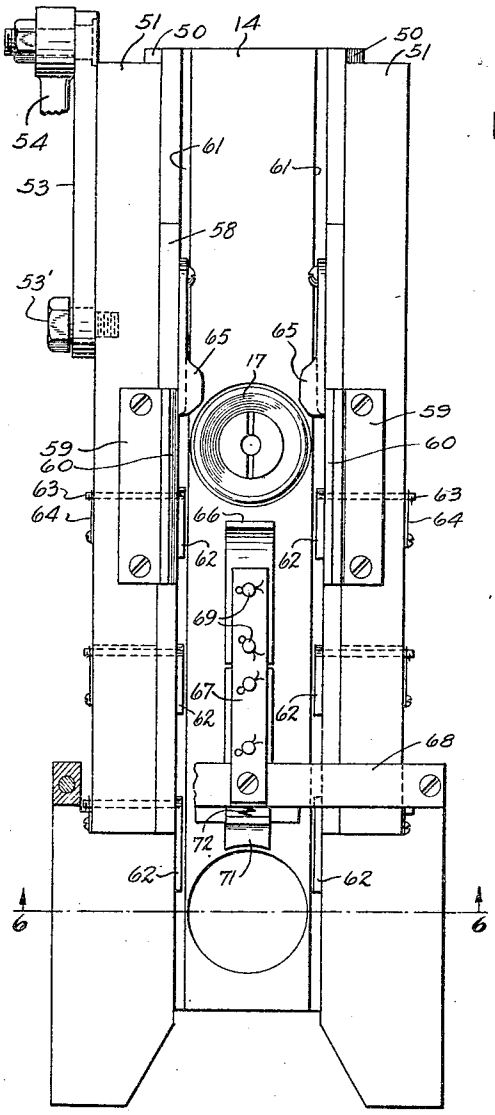
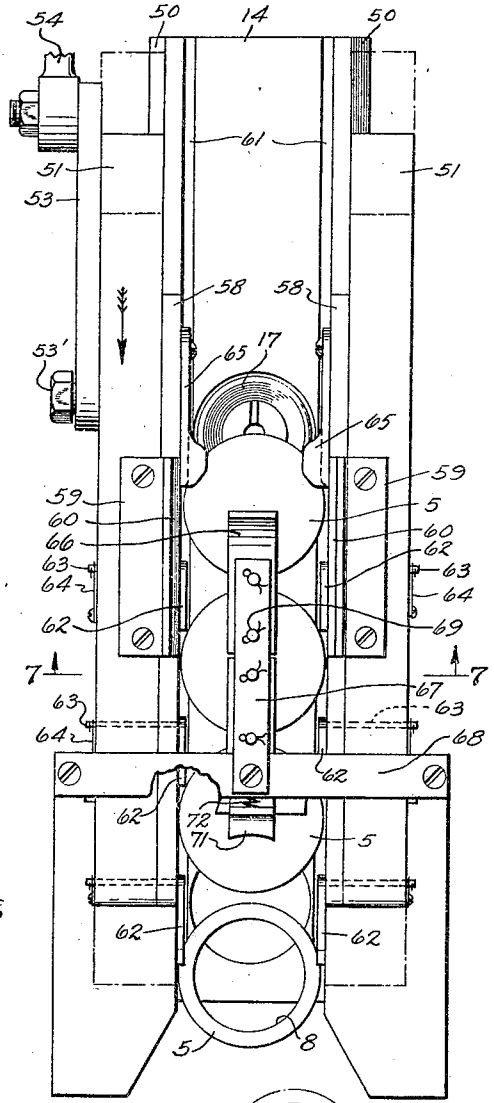


Fig 5



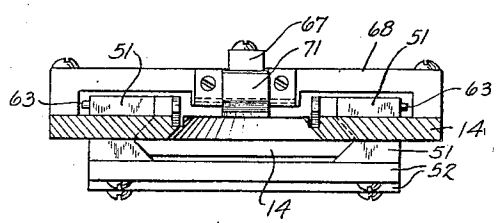
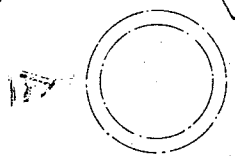


Fig 6



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May 12, 1931. W. KOWAL 1,805,336

BLANK FEEDING MECHANISM FOR PUNCH PRESSES

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Fig 8

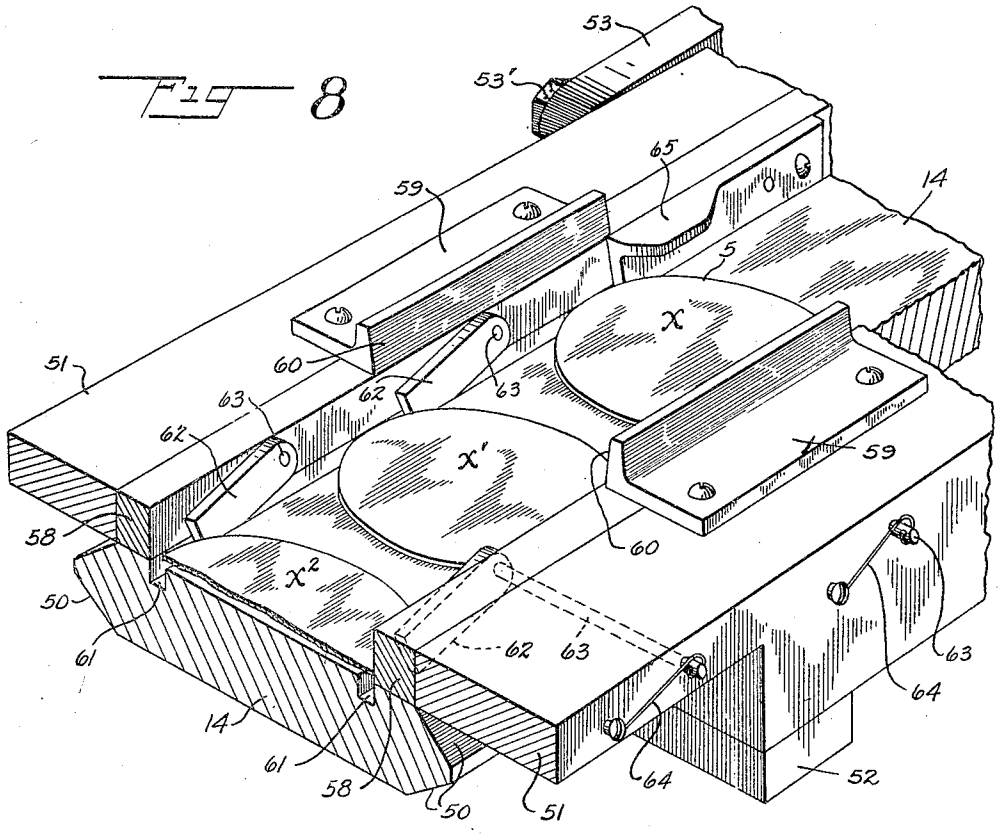
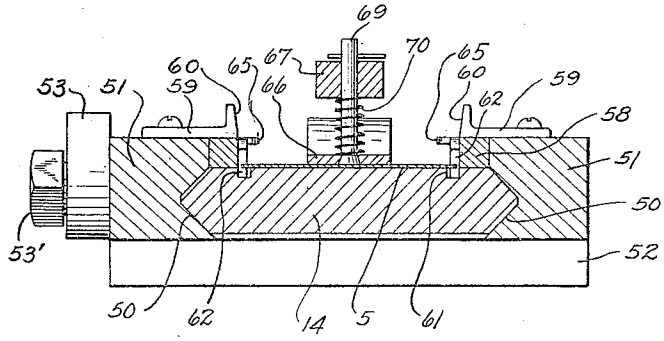


Fig 7



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BLANK FEEDING MECHANISM FOR PUNCH PRESSES

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Fig 10

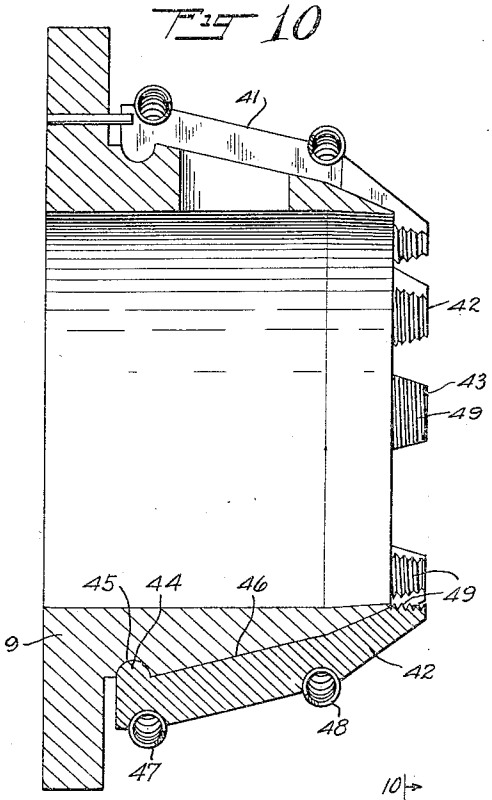


Fig 12

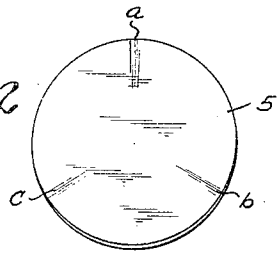


Fig 13

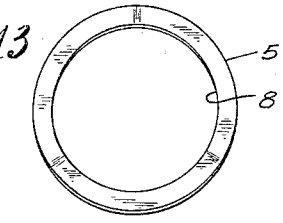


Fig 14

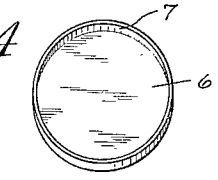


Fig 9

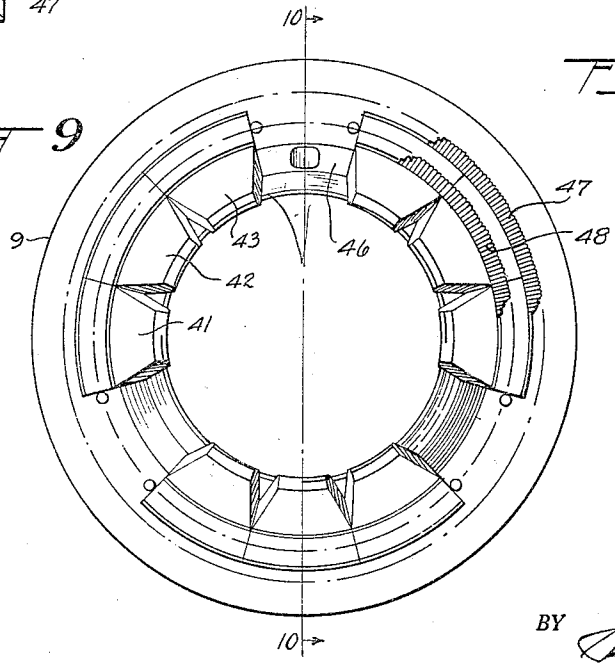
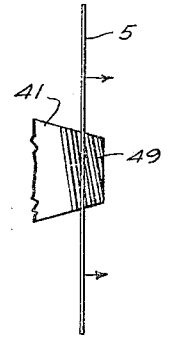


Fig 11



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Patented May 12, 1931

1,805,336

UNITED STATES PATENT OFFICE

WALTER KOWAL, OF NEW YORK, N. Y., ASSIGNOR TO PHOENIX-HERMETIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK

BLANK FEEDING MECHANISM FOR PUNCH PRESSES

Application filed August 14, 1929. Serial No. 385,947.

The invention relates to new and useful improvements in a machine for forming bottle caps and more particularly to a feeding mechanism for feeding the blanks one at a time from a stack to the punch which cuts and initially shapes the bottle cap.

An object of the invention is to provide a feeding mechanism wherein the blanks may be stacked one on another and forcibly fed one at a time from the bottom of the stack without any danger of more than one blank being drawn from the stack at the same time.

A further object of the invention is to provide a feeding mechanism of the above type wherein the blank being drawn from the stack is flexed or bent so as to insure the breaking of the suction hold of the lowermost blank on the blank next above and the removal of the lowermost blank only.

A still further object of the invention is to provide a feeding mechanism for feeding circular blanks wherein the stack of blanks is supported by spaced members having inclined grooves on their faces which contact with the edge portions of the blanks and insure the separation of the blanks so that one blank only is fed from the stack at a time.

A still further object of the invention is to provide means for receiving the blank when it is removed from the stack and for positively feeding the blank by a step by step movement to the cutting and shaping punch.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings:—

Fig. 1 is a side view of a machine embodying the invention.

Fig. 2 is a top view in the direction of the arrow in Fig. 1.

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a plan view on the line 4—4 of Fig. 3.

Fig. 5 is a view similar to Fig. 4 showing the blanks in the machine and being fed forward to the forming punch.

Fig. 6 is a sectional view on the line 6—6 of Fig. 4.

Fig. 7 is a sectional view on the line 7—7 of Fig. 5.

Fig. 8 is a view partly in perspective and partly in section of a portion of the supporting bed and showing the feeding members for moving the blanks.

Fig. 9 is a bottom plan view of the stack holder.

Fig. 10 is a sectional view on the line 10—10 Fig. 9.

Fig. 11 is a detail showing the lower end of one of the holding dogs and a blank passing the same.

Fig. 12 is a perspective view of one of the needle blanks from which the cap is cut and formed.

Fig. 13 is a similar view showing the blank after the metal to form the cap is cut therefrom.

Fig. 14 is a view showing the initial formation of the cap.

The invention is directed to a machine for forming bottle caps and more particularly to the means for feeding the blanks to the press which cuts the blank and shapes the metal for the initial step in the formation of the cap. Bottle caps are relatively small as compared with jar closures and may be made from the scrap discs which are cut from the metal in the forming of a closing band or a closing ring used in connection with a jar closure. It is difficult, however, to handle these circular blanks in the presenting of the same to a machine which cuts and forms a cap therefrom.

The present invention has particularly to do with the stocking and feeding of these circular blanks to a press for cutting and shaping the blank. The discs are placed in a stack holder which is provided with a series of yielding holding dogs or members which sustain the stack and permit the discs to be removed one at a time from the lower end of the stack past said holding dogs or members. There are a series of these holding dogs which support the stacked blanks. The stacked blanks are placed in a stack holder having a cylindrical base portion and the holding dogs are mounted on this cylindrical base portion. The holding dogs are

so positioned that the lower ends thereof project inside of the inner face of the opening in the base through which the stacked blanks pass. The inner face of each dog is also provided with threads or grooves which extend across the end of the dog at an inclination to the plane of the blank which is supported by the dogs.

The dogs are preferably arranged in groups of three and the grooves or threads in the three dogs are in alignment. Thus it is that the thread formed in the face of the holding dogs has a high point at one side of the group of dogs. There are three groups of dogs so that there are three points of support which first make contact with the blank. The blank is removed from the stack by a vacuum cup which engages the blank on the under face thereof and forcibly draws it from the stack. This forcible drawing of the disc past the supporting threads on the holding dogs causes the blank to be flexed so as to break any suction hold of the lowermost blank on the blank next above and it also separates the blanks and insures that only one blank will be withdrawn from the stack at a time. The blank is placed by the suction cup onto the feed table and is moved along the feed table to the punch by a reciprocating feed slide which is provided with a series of yielding feed fingers which positively move the blank step by step to the cap forming machine.

Referring more in detail to the drawings, the invention is shown as applied to a cap forming machine which includes a supporting base 1 carrying an upper frame work 2 in which are mounted cap forming devices. These cap forming devices consist of a forming die 3 and a punch 4. The forming die and punch are of the usual well known type which operate to cut the metal from a blank to form a cap and to bend the edge portions of the cut part to form a hat-shaped member which is the initial step in the forming of the cap.

In Fig. 12 of the drawings a circular metal blank 5 is shown which is the waste metal cut in the forming of a ring or band used in connection with a jar closure. The cap to be formed is shown in Fig. 14 and consists of a top portion 6 and a flange 7. The flange 7 is substantially at right angles to the top portion 6. The metal of the blank 5 is first cut along the circular line 8 and thus produces a metal portion which may be shaped into the cap. This portion of metal when the edge is bent at right angles is the initial step in the forming of the bottle cap. The metal blanks 5 are stacked one on another and placed in a stack holder consisting of a base portion 9 which has a cylindrical opening 10 therethrough. The extreme lower portion 11 of the base portion 9 inclines inwardly slightly toward the lower end. The stack holder also includes a supporting member 12 with a cut away portion 13 which facilitates the placing of the circular blanks in the stack holder. The stack holder is placed above the bed 14 carried by a bracket which is attached to the upper frame member 2 of the press. The bed 14 is provided with a depending sleeve 15 in which is mounted a plunger 16 carrying a suction cup 17 at its upper end. The plunger 16 is mounted to slide freely in the sleeve 15 and the longitudinal axis of the plunger is in alignment with the longitudinal center of the stack holder. The plunger is reciprocated by means of a link 18 which is pivoted to a lever 19. The lever 19 in turn is mounted for oscillation on a supporting shaft 20 and is oscillated by means of a roller 21 running in a cam groove 22 in a disc 23 carried by the shaft 24. The shaft 24 carries a sprocket wheel 25 and a sprocket chain 26 runs over this sprocket wheel and over a sprocket wheel 27 carried by the shaft 28. The shaft 28 is attached to a belt wheel 29 driven by a belt 30.

It is the shaft 28 which reciprocates the punch of the press, and thus it is that the shaft 24 is driven in timing with the shaft which operates the punch. The plunger 16 is given one reciprocation for each reciprocation of the punch.

The sleeve 15 is provided with an opening 31 to which is connected a pipe 32. The pipe 32 leads to a vacuum pump 33 having a piston 34 connected by means of a link 35 to a crank 36 carried by the shaft 28. As the shaft 28 rotates it will reciprocate the piston 34 and will create a vacuum within the pump 33 which will produce a vacuum pull in the pipe 32. Inasmuch as this vacuum pump is operated by the shaft 28 it will likewise be operated in timing with the operations of the plunger 16. The plunger 16 has a central opening 37 therein. A port 38 extends from the central opening to the outer face of the sleeve and at times this port 38 registers with the opening 31. There is also a port 39 which at times registers with the opening 40 leading through the sleeve 15 to the atmosphere. When the plunger is raised so as to bring the suction cup into contact with the lowermost blank in the stack holder, the port 38 will register with the opening 31 after the cup is brought into contact with the blank, and this will create a suction so as to cause the suction cup to firmly grip the lowermost blank in the stack. When the plunger starts down the port 38 moves away from the opening 31 but remains closed and the blank is, therefore, gripped by the suction produced in the cup.

When the port 39 reaches the opening 40 the suction will be released and this opening 40 is so positioned that the suction is released so as to release the blank just as the cup passes beneath the bed 14. This will lay the blank

on the bed ready for the operation of the feeding mechanism thereof.

Associated with the stack holder are a series of holding and supporting dogs. There are three groups of these holding dogs and the holding dogs in each group are indicated at 41, 42 and 43. Each holding dog has a rounded face projecting rib 44 which is adapted to seat in a recess 45 which is shaped to conform thereto. These dogs have their inner faces also shaped to conform to the outer face 46 of the supporting base 9. An endless coil spring band 47 encircles the upper ends of the dogs and is seated in a recess formed in the dogs. An endless coil spring band 48 encircles the dogs adjacent the lower end of the base 9 and is seated in a recess in the dogs. These coil springs hold the dogs yieldingly pressed against the faces 46 of the base of the stack holder. Each dog is provided with a series of projecting V-shaped threads 49. The three dogs in a group are preferably threaded at the same time so that the threads are in alignment and this will produce a high point in each group on which the lowermost blank of the stack first rests. These three high points of support are indicated at *a*, *b* and *c* in Fig. 12 of the drawings.

It will be apparent that when the suction cup engages the blank and pulls the blank past these points of support there will be a certain flexing of the blank which will insure a breaking of the suction hold of the lowermost blank on the next adjacent blank. The pulling of the blanks by these threaded ends of the dogs will also tend to separate the blanks and insure that one blank only will be pulled at a time from the stack. The suction cup pulls the blank from the stack and places the same on the supporting bed 14.

The supporting bed, as clearly shown in Figs. 7 and 8, is provided with inclined faces 50, 50. Mounted on the bed and movable thereon in a lengthwise direction of the bed is a feed slide consisting of side members 51, 51 which are joined by means of cross plates 52, 52 and these side members are provided with recesses shaped to conform to the inclined faces 50 of the bed 14. Thus it is that the feed slide is suspended on the bed and is free to move back and forth thereon. The feed slide is reciprocated by means of a link 53 which is pivoted at 53′ to the feed slide. This link is connected to the upper end of a lever 54 which is mounted for free oscillation on a shaft 55. At the lower end of the lever is a roller stud 56 which runs in a cam groove indicated in dotted lines at 57 in Fig. 3 of the drawings. As the shaft 24 rotates it will reciprocate the feed slide back and forth.

The feed slide is provided with bars 58, 58. Plates 59, 59 overlie these bars 58 and are provided with inclined faces 60, 60 which serve to guide the discs and insure the proper placing of the same on the bed 14. The bed 14 has a recess 61 along the inner faces of the bars 58, 58. Feed fingers 62 are mounted on the shafts 63 which in turn are mounted in the feed slides. A spring 64 associated with each shaft 63 normally tends to turn these fingers so as to move the outer free ends thereof downwardly. The fingers will run in the groove 61. The bar 58 is also provided with a rigid projecting bracket 65. The feed slide is so timed and the bracket 65 so positioned that when the disc is moved downward onto the bed 14 it will pass the bracket 65. When the feed slide moves forward toward the punch the bracket 65 engaging the disc will move the disc along with the feed slide. The disc as received from the stack is received in the position indicated at *x* in Fig. 8 of the drawings. When the feed slides moves forward it will move the disc to the position *x′*. The feed slide is then retracted and as it is retracted the feed fingers 62 pass over the disc and drop in rear thereof so that when the feed slide is again moved forward the disc will be carried forward to the position *x²*.

As soon as the disc is moved from a position directly underneath the stack holder it is moved underneath a yielding presser foot 66. The presser foot 66 is carried by a bracket 67 mounted on a bar 68 which in turn is mounted on the frame of the machine. The presser foot is provided with a series of posts 69 which pass through suitable openings in the bracket 67. A spring 70 surrounds each post and these springs normally force the presser foot downwardly. The presser foot has an upturned toe and the discs pass underneath this presser foot which yieldingly clamps the discs against the bed and holds said discs from movement back with the feed slide as it returns to receive another disc from beneath the stack.

Also mounted on the bar 68 is a retaining dog 71. Said dog is pivoted to the bar 68 and a spring 72 normally holds the free end of the dog pressed downward toward the bed.

As clearly shown in Fig. 5 the disc is fed from beneath the stack holder step by step until it is delivered to the forming die of the punch press. It is held in proper position for the punch by this retaining dog 71. After the cap has been cut from the blank and formed, then the ring of waste material is fed from the die by means of the end feed fingers on the feed slide, as clearly shown in Fig. 5.

The operation of the machine is thought to be apparent from the above detailed description. The discs from which the caps are to be formed are placed in the stack holder and are forcibly withdrawn one at a time by the suction cup from the stack holder. As these discs are carried by the threaded ends of the supporting dogs they will be properly flexed or bent so as to break the suction between the lowermost disc and the

next adjacent disc and these threaded ends will also separate the discs so as to insure that only one disc at a time will be fed from the stack holder onto the supporting bed. The feed slide then moves forward carrying the disc one step toward the punch and this step movement of the feed slide moves the disc beneath the presser foot which yieldingly clamps said disc and holds the same while the feed slide returns for the next disc. The feed fingers then take up the disc and feed it another step and so on until it is delivered to the press. These same feed fingers will remove the scrap ring from the press after the metal has been cut and the cap formed.

It is obvious that minor changes in the details of construction and the arrangement of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having fully described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. The combination of a stack holder having yielding spaced dogs for supporting stacked blanks, said dogs having the supporting faces thereof provided with inclined threads arranged so as to be successively engaged by the blanks as they are withdrawn from the stack holder, and means for forcibly withdrawing the lowermost blank past said threads.

2. The combination of a stack holder having groups of yielding spaced dogs for supporting stacked blanks, said dogs having the supporting faces thereof provided with inclined threads arranged in alignment and so that said threads are successively engaged by the blanks as they are withdrawn from the stack holder, and means for forcibly withdrawing the lowermost blank past said threaded faces.

3. The combination of a stack holder having yielding spaced dogs for supporting stacked blanks, said dogs having the supporting faces thereof provided with inclined threads arranged so as to be successively engaged by the blanks as they are withdrawn from the stack holder, means for forcibly withdrawing the lowermost blank past the threaded faces including a suction cup, a reciprocating plunger carrying said suction cup, and valve controlled vacuum creating means for said cup.

4. The combination of a stack holder including a supporting base having an opening therethrough through which the stack is adapted to pass, a series of dogs pivotally supported on the outer face of said base, yielding means for pressing said dogs inwardly, the lower ends of said dogs being extended beneath the supporting base and into the path of the stack for supporting the stack, the supporting faces of said dogs having an inclined rib, and means for forcibly withdrawing the lowermost blank past said ribbed faces.

5. The combination of a stack holder including a supporting base having an opening therethrough through which the stack is adapted to pass, a series of dogs pivotally supported on the outer face of said base, yielding means for pressing said dogs inwardly, the lower ends of said dogs being extended beneath the supporting base and into the path of the stack for supporting the stack, the supporting faces of said dogs having an inclined rib, a suction cup, a plunger carrying said suction cup, a suction creating means associated therewith whereby said cup may be caused to engage the lowermost blank in the stack and forcibly withdraw said blank past the ribbed faces.

6. The combination of a stack holder for metal blanks, a supporting bed beneath the stack holder, means for withdrawing the metal blank from the stack holder on to the supporting bed, spaced reciprocating feed bars movable along the bed and between which said blanks are positioned, yielding fingers carried by the fed bars and adapted to engage the blanks, and a yielding presser foot beneath which the blanks are moved by the feed fingers, said yielding presser foot operating to retain the blanks when the feed fingers are retracted.

7. The combination of a stack holder for metal blanks, a supporting bed beneath the stack holder, means for withdrawing the metal blank from the stack holder on to the supporting bed, spaced reciprocating feed bars movable along the bed and between which said blanks are positioned, yielding fingers carried by the feed bars and adapted to engage the blanks, a yielding presser foot beneath which the blanks are moved by the feed fingers, said yielding presser foot operating to retain the blanks when the feed fingers are retracted, and means disposed between the bed and the stack holder for directing the blanks on to the bed between the feed bars.

8. The combination of a stack holder for metal blanks, a supporting bed beneath the stack holder, means for withdrawing the metal blank from the stock holder on to the supporting bed, and means for feeding the blank along the bed to a forming punch including reciprocating feed bars for engaging and moving the blanks step by step along the bed to the forming punch and for removing the waste material of the blank from beneath the punch.

9. The combination of a stack holder for metal blanks, a supporting bed beneath the stack holder, means for withdrawing the metal blank from the stack holder on to the supporting bed, and means for feeding the blank along the bed to a forming punch including reciprocating feed bars for engaging

and moving the blanks step by step along the bed to the forming punch and for removing the waste material of the blank from beneath the punch, and a yielding presser foot beneath which the blanks are fed from the stack holder to the forming punch.

10. The combination of a stack holder for metal blanks, a supporting bed beneath the stack holder, means for withdrawing the metal blank from the stack holder on to the supporting bed, means for feeding the blank along the bed to a forming punch including reciprocating feed bars for engaging and moving the blanks step by step along the bed to the forming punch and for removing the waste material of the blank from beneath the punch, a yielding presser foot beneath which the blanks are fed from the stack holder to the forming punch, and a retaining dog for holding said blanks positioned for the forming punch.

In testimony whereof, I affix my signature.

WALTER KOWAL.