Feb. 14, 1933. C. T. BRENNAN 1,897,359

CUT-OFF MECHANISM FOR BALL MACHINES

Filed Aug. 25, 1932

Fig. 1

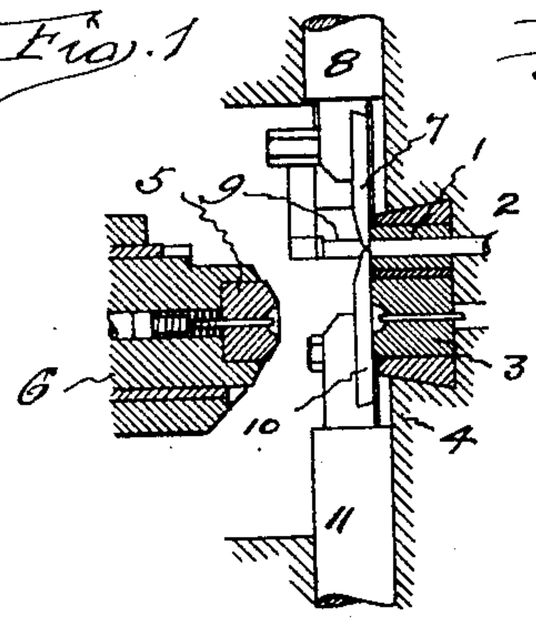


Fig. 2

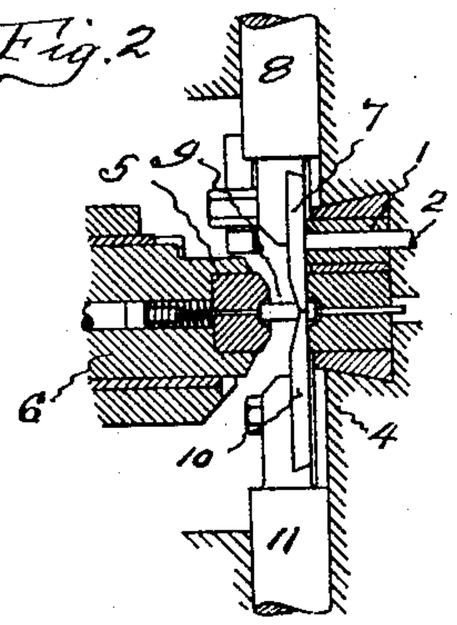


Fig. 3

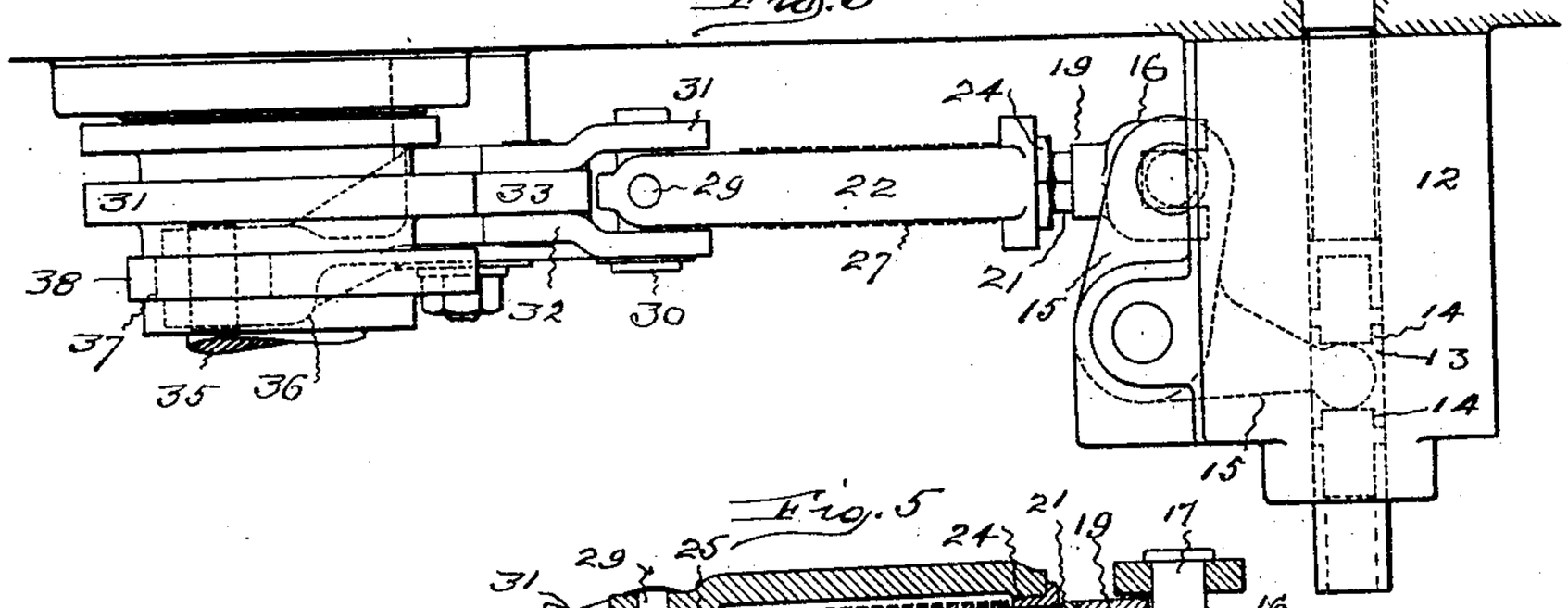


Fig. 5

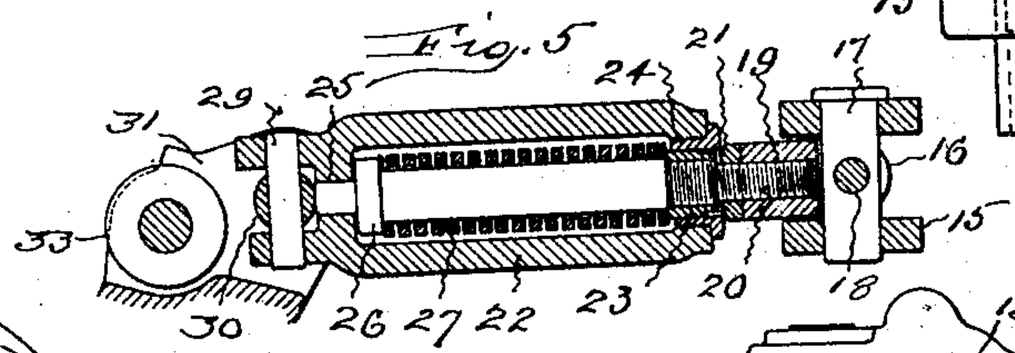


Fig. 4

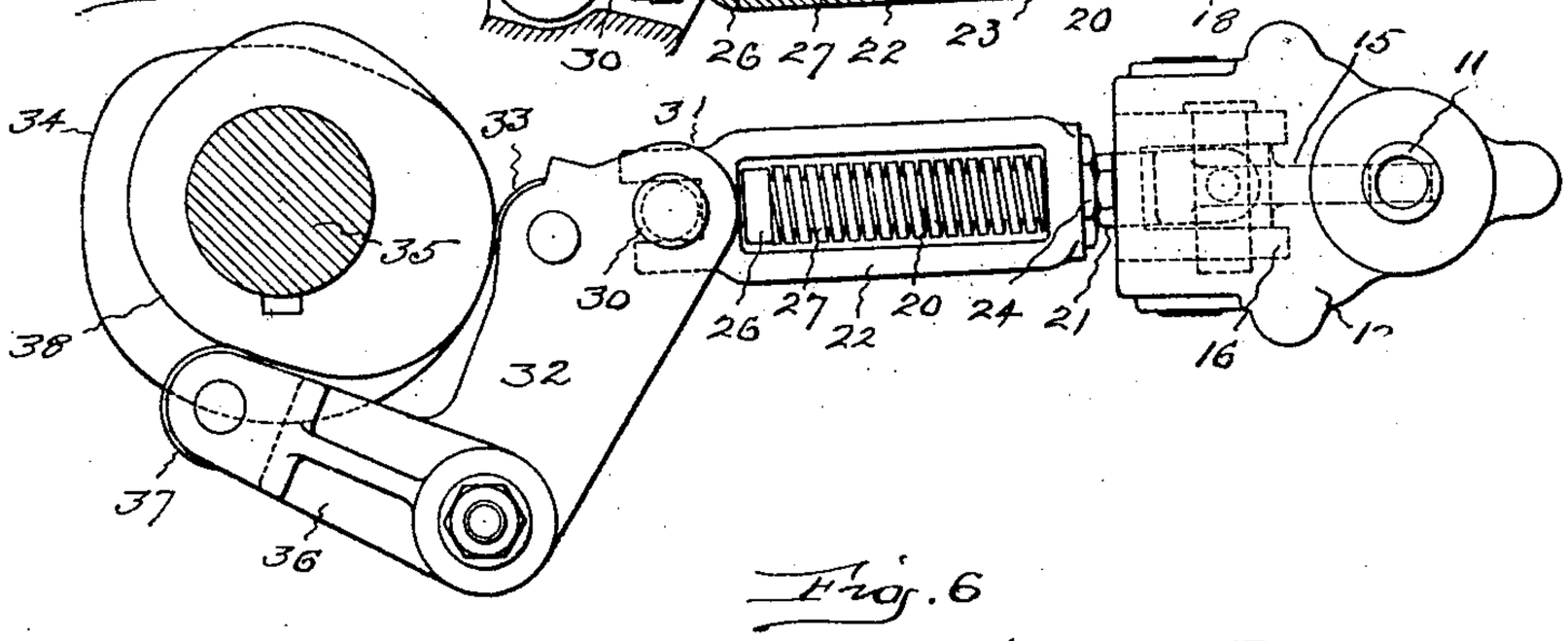
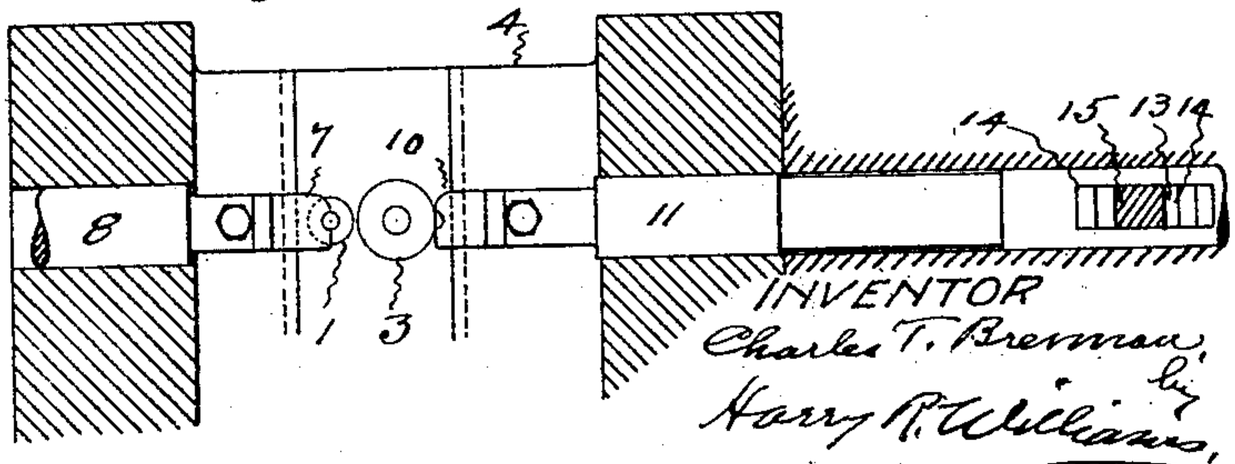


Fig. 6



INVENTOR
Charles T. Brennan,
by
Harry P. Williams,
Atty.

Patented Feb. 14, 1933

1,897,359

UNITED STATES PATENT OFFICE

CHARLES T. BRENNAN, OF WATERBURY, CONNECTICUT

CUT-OFF MECHANISM FOR BALL MACHINES

Application filed August 25, 1932. Serial No. 630,325.

This invention relates to the cut-off mechanism of metal swaging machines of the type in which a rod, either hot or cold, is entered and sections cut off and carried into line with a punch and die which have complementary recesses that shape the blanks into balls. A mechanism of this character is illustrated and described in U. S. Patent No. 1,857,997 issued May 10, 1932.

It is essential in order that the balls be spherical and of equal density throughout, that the blanks be cut squarely and presented in exact axial alignment with the punch and forming die, and in order to assure this the blanks must be firmly held when cut and the mechanisms for transferring the blanks must operate accurately and be capable of quick and long continued action with a minimum amount of wear.

The object of the present invention is to simplify, lighten and make more durable and accurate the mechanism heretofore employed for operating the backing blade which co-operate with the cutting blade, so that the cut will be square and the blanks will be carried into exact axial alignment with the semi-spherical cavities in the punch and forming die.

In accomplishing this object the backing bar is engaged by a simple bell crank lever that is connected by a yielding slip-joint link with a bell crank lever provided with rolls which are engaged by cams so timed as to cause the backing blade to be reciprocated at the correct times and in the proper manner to accomplish its work.

Fig. 1 of the accompanying drawing is a sectional view of the punch and dies, showing the relation of the cutting blade and the backing blade when about to cut a blank from a continuous rod.

Fig. 2 is a similar view showing the relation of blades with the cut blank carried between the punch and forming die.

Fig. 3 shows the relation of the blades and the punch and dies when a ball is being formed also a plan of the mechanism for operating the backing blade.

Fig. 4 is an elevation of the backing blade operating mechanism.

Fig. 5 shows a section of the yielding link in said operating mechanism.

Fig. 6 is a section through the frame looking toward the cutting and backing blades and the dies.

The cutting die 1 through which the rod 2 is fed, and the forming die 3 with a semi-spherical recess, are located in the front wall 4 of the frame of the machine in the usual manner. The punch 5 with a semi-spherical recess, is mounted in the punch holder 6 that is reciprocated by well known means.

The cutting blade 7 is fastened to the cutter bar 8 that is reciprocated by common mechanism for causing this blade to sever a blank 9 from the rod and transfer it from the cutting die to the forming die. The backing blade 10 which co-operates with the cutting blade to ensure the square cutting of the blank and transfer of the blank to exact position between the punch and forming die, is fastened to the backing blade bar 11 that is reciprocated by mechanism which constitutes the subject of this improvement.

The backing blade bar extends through the side of the machine frame and its outer section, which is preferably tubular, is supported by a bracket 12. A slot 13 is made horizontally through the outer section of this bar and the end walls of the slot provided with hardened plugs 14. A bell crank lever 15 is pivoted to swing horizontally in the bracket with the rounded end of one limb extending into the slot and engaging the plugs. The other limb of this lever is forked and is connected with the forked head 16 of a coupling by a stud 17 and pin 18.

Threaded into the hub 19 of the coupling is the threaded end of a rod 20 that forms one member of the slip joint yielding link. A lock nut 21 is threaded on the rod to ensure a positive connection between the rod and the coupling. The rod extends into the member 22 of the link, having a threaded collar 23 that slidably fits a bushing 24 in one end of the member 22, and a stud 25 that slidably fits an opening in the other end of the member 22. The rod has a collar 26 and on the rod, thrusting between the collar and the

other end of the member 22 is a stiff spring 27.

An end of the link member 22 is forked and by a pin 29 and stud 30 is connected with the forked end 31 of the limb 32 of a bell crank lever. This limb has a roll 33 that is engaged by a cam 34 mounted on the crank shaft 35 of the machine. The limb 36 of this lever has a roll 37 that is engaged by a cam 38 on the crank shaft.

When the machine is in operation the cam 38 engages the roll 37 and causes the lever 36 to pull back the link member 22, and this, through the spring and slip rod which forms the other member of the link, causes the lever 15 to push in the backing bar until the backing blade engages the stock that is fed into the machine, which position of the blade is shown in Fig. 1. The throw of this cam is slightly greater than is necessary to carry the backing blade against the stock but the spring yields and the backing blade is held against the stock with a firm but yielding pressure. As the cutter blade moves in and severs the stock that is backed by the backing blade the cams allow the backing blade to move outward so that the backing blade will travel with the cutting blade and carry the severed blank into line with the axis of the recesses in the punch and forming die, the position shown in Fig. 2.

The cams are timed so that the backing blade is not pulled away but is held with a yielding pressure against the blank. As the advancing punch engages the blank the cutter blade is withdrawn by the usual mechanism, and the cam 34 then further withdraws the backing blade so that the blades are out of the path of the punch as it continues its movement and forms the blank into a ball, which position of the parts is shown in Fig. 3. The backing blade has a longer travel than the cutter blade and the timing of the cams is such that the backing blade moves inward toward the cutter blade faster than the cutter blade moves inward, and they give the backing blade a slower outward movement than the inward movement of the cutter blade so that the blades move together for cutting and carrying the blank to the punch and forming die. This construction renders it unnecessary to absolutely synchronize the backing blade cams with the mechanism which operates the cutter blade. By the mechanism described the blanks are cut with square ends and are accurately carried into line with the cavities of the punch and die so that substantially perfect spheres of uniform density are produced with a minimum of wear on the punch and die, and the several cams which actuate the blades. There are relatively few parts and joints to cause friction and to wear, and thus accuracy is preserved for a long period although the machine is operated very rapidly.

The invention claimed is:

1. In a ball header in combination with the punch, dies and reciprocatory cut-off blade, a backing blade movable toward, then with, and then from the cut-off blade, a reciprocatory bar carrying the backing blade, a bell crank lever engaged with said bar, a yielding slip-joint link connected with said lever, and a cam actuated bell crank lever connected with said link, and causing said movements of the backing blade.

2. In a ball header in combination with the punch, dies and reciprocatory cut-off blade movable toward, then with, and then from the cut-off blade, a backing blade, a reciprocatory bar carrying the backing blade, said bar having a slot near its outer end, a bell crank lever with one end entering and engaging the walls of said slot, a coupling connected with the other end of said lever, a yielding slip-joint link connected with said coupling, a bell crank lever connected with said link, and cams for oscillating said last mentioned lever, and causing said movements of the backing blade.

3. In a ball header in combination with the punch, dies and reciprocatory cut-off blade movable toward, then with, and then from the cut-off blade, a backing blade, a reciprocatory bar carrying the backing blade, a a horizontally oscillating bell crank lever with one end engaged with said bar, a coupling connected with the other end of said lever, a yielding slip-joint link connected with said coupling, a bell crank lever connected with said link, and cams for oscillating said last mentioned lever, and causing said movements of the backing blade.

4. In a ball header in combination with the punch, dies and reciprocatory cut-off blade, a backing blade, a reciprocatory bar carrying the backing blade, a bell crank lever with one end engaged with said bar, a universal joint coupling connected with the other end of said lever, a yielding slip-joint link connected with said coupling, a bell crank lever connected by a universal joint with said link, and cams for oscillating said last mentioned lever, and causing said movements of the backing blade.

5. In a ball header in combination with the punch, dies and reciprocatory cut-off blade, a backing blade, a reciprocatory bar carrying the backing blade, a bell crank lever engaged with said bar, a coupling connected with said lever, a yielding slip-joint link connected with said coupling, a bell crank lever connected with said link, a pair of rolls spaced apart on said latter lever, and a pair of cams for engaging said rolls and oscillating said latter lever, and causing said movements of the backing blade.

CHARLES T. BRENNAN.