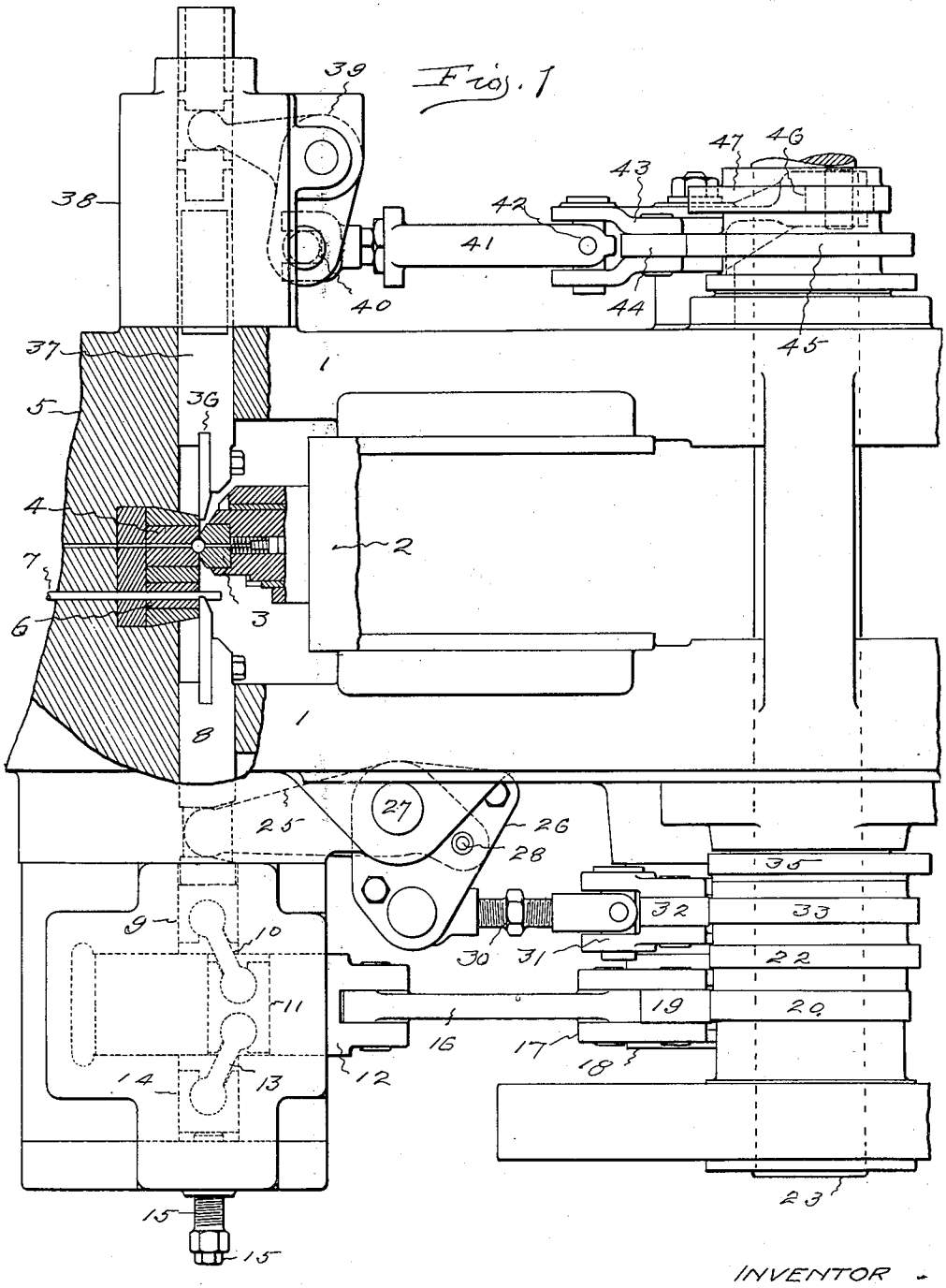
Jan. 29, 1935. C. T. BRENNAN 1,989,398

CUT-OFF MECHANISM FOR HEADING MACHINES

Filed July 19, 1934 3 Sheets-Sheet 1



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CUT-OFF MECHANISM FOR HEADING MACHINES

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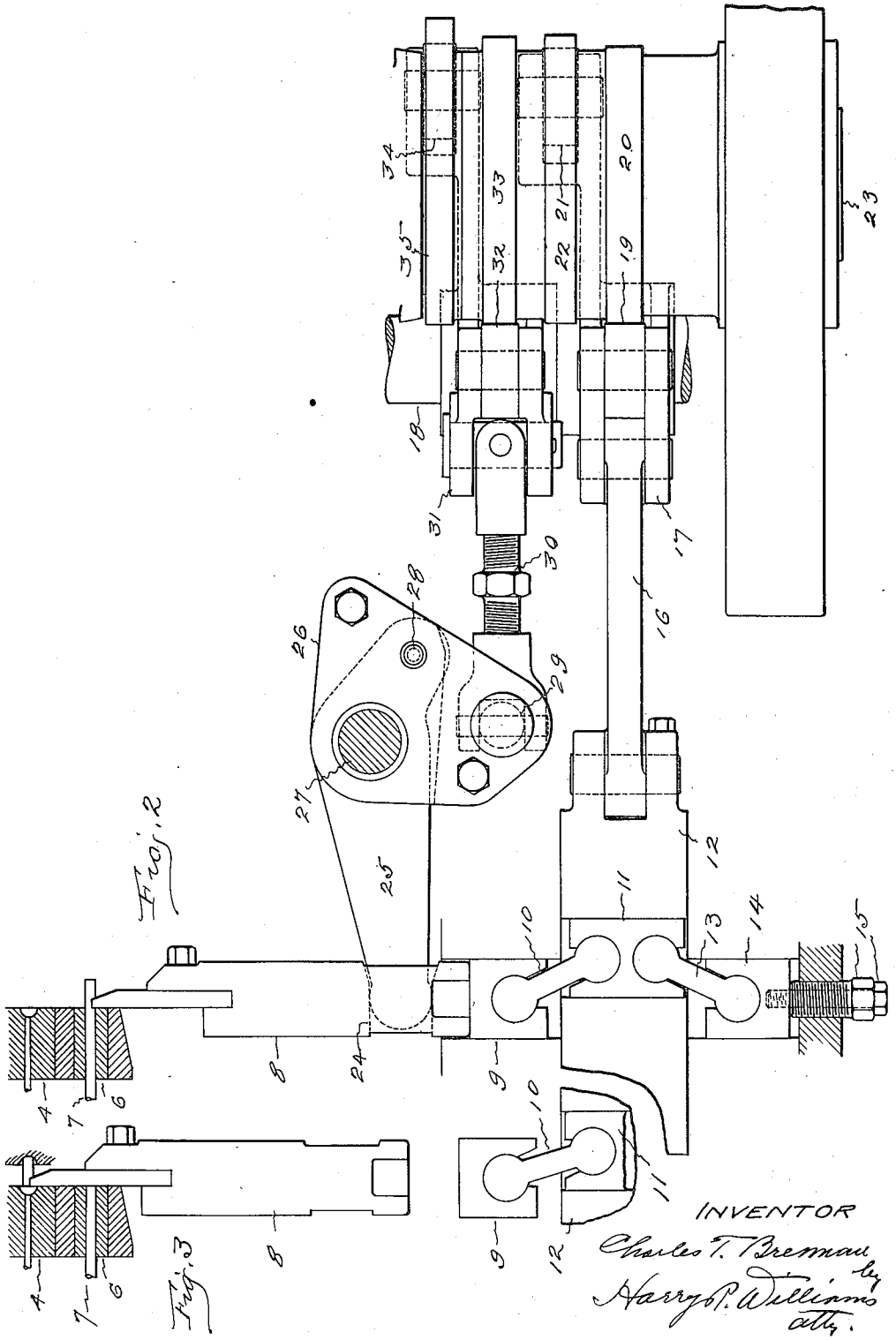


Fig. 2

Fig. 3

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CUT-OFF MECHANISM FOR HEADING MACHINES

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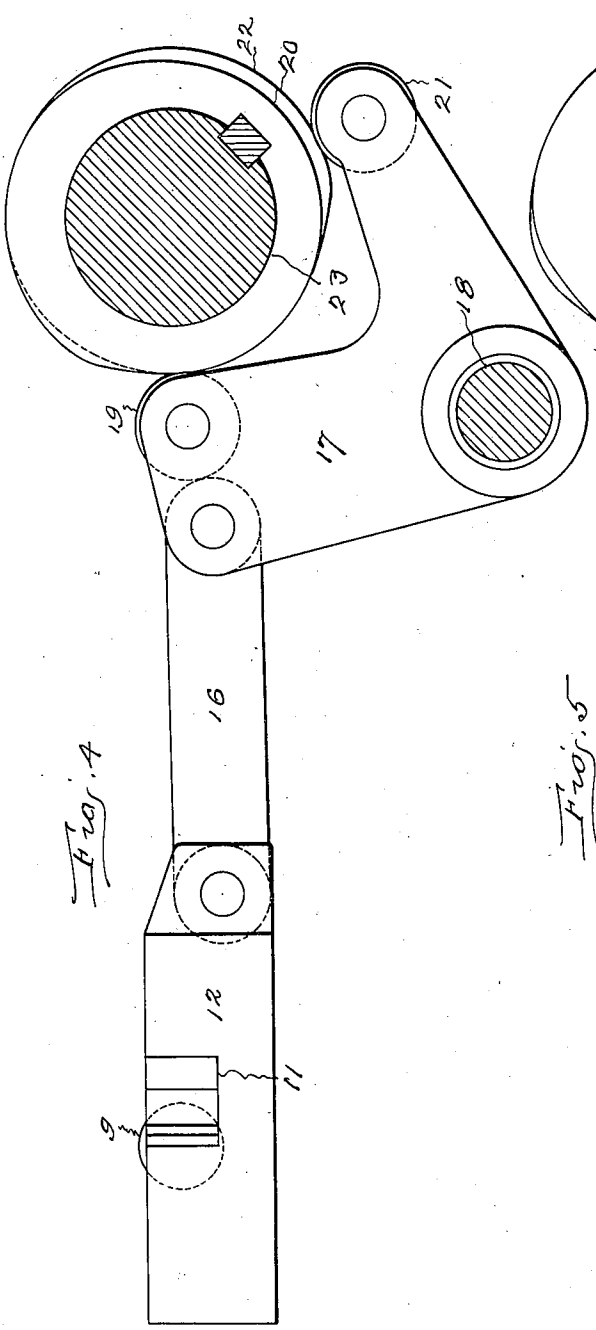


Fig. 4

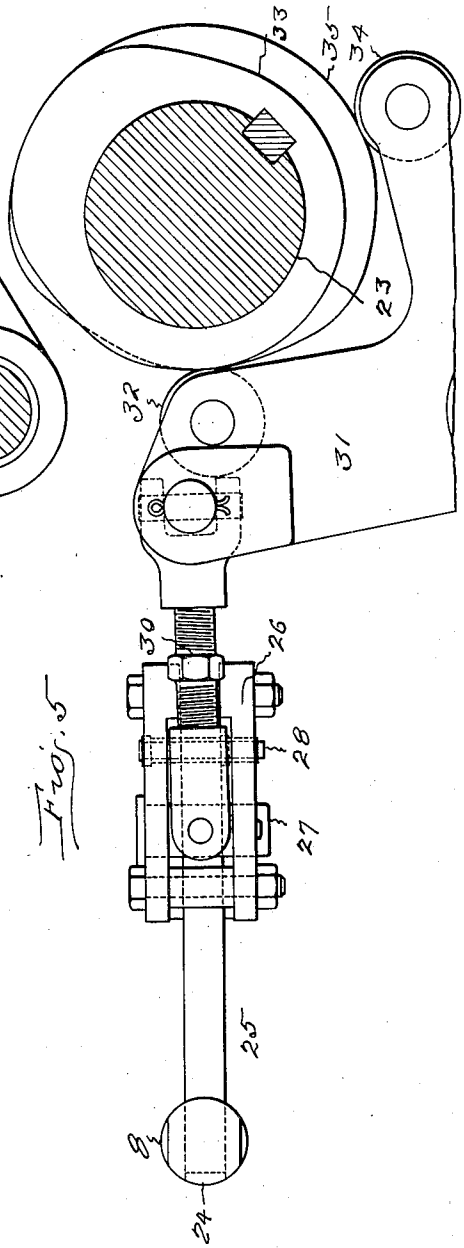


Fig. 5

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CUT-OFF MECHANISM FOR HEADING MACHINES

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12 Claims. (Cl. 29—34)

This invention relates to the cut-off mechanism of metal swaging machines into which rod, either hot or cold, is entered through cut-off dies and sections severed and transferred into line with operating tools, usually a punch and die, which have complementary shapes, as recesses, for conforming the cut pieces. As the present invention is applicable to a machine for making metal balls, it is herein described as designed for such a machine, although it may be applied to machines for shaping other articles.

The object of the invention is to provide for machines of this class means for operating the bar which carries the severing cutter that are relatively simple to manufacture and install and are easily adjustable for obtaining accurate and square cuts from rod of different diameters, and which permit operation of the machines at high speeds.

In attaining this object a dual coacting mechanism is supplied for reciprocating a sectional cutter bar which moves at right angles to the fed rod and to the traverse of the gate that carries one of the tools. This mechanism, in the embodiment of the invention illustrated, comprises a cam actuated toggle arranged to impart to the cutter bar a short forward movement adequate to cut the rod and a cam actuated bell crank lever which continues the forward movement of a member of the cutter bar sufficient to transfer the cut piece, whereby great power is attained for severing the piece to be conformed and rapid action is possible for carrying the severed piece from feed position into line with the tools and for the return of the cutter bar. A backing mechanism is usually employed for ensuring a square cut and positive transfer of the cut piece.

In the accompanying drawings Fig. 1 is a plan view of the improved cutter mechanism and backing mechanism, shown as applied to the frame of a metal swaging machine of well known type, the punch operating mechanism being omitted as details thereof are not a feature of the present improvement.

Fig. 2, on larger scale, shows a plan view of the cutter mechanism disassociated from the frame of the machine, with the cutter in position for severing a piece from the end of a rod.

Fig. 3 shows the relative positions of the members of the cutter bar when the cutter has carried the severed piece into alignment with the forming tools.

Fig. 4 shows a side elevation of the toggle actuating mechanism.

Fig. 5 shows a side elevation of the bell crank actuating mechanism.

In the machine illustrated the frame 1 supports the ordinary reciprocating gate 2 which carries the movable conforming tool, in this case punch 3, that is reciprocated toward and from the fixed conforming tool, in this case die 4, that is set in the head end 5 of the frame. Set in the frame adjacent to the conforming die is a cutting die 6 through which the rod of stock 7 is fed by the commonly employed feed mechanism.

The cutter bar which reciprocates in the frame at right angles to the stock to be severed is sectional being comprised of an inner member 8 and an outer member 9. These members are aligned and during one interval are engaged with each other, as shown in Fig. 2, and during another interval are separated from each other, as shown in Fig. 3, owing to the longer movement that is imparted to the inner member 8 by the bell crank mechanism than the movement imparted to the outer member 9 by the toggle mechanism.

The outer member 9 is short and has a recess for receiving one end of a toggle link 10. The other end of this toggle link is in a recess in the block 11 which is movable transversely of but longitudinally with a slide 12. One end of a toggle link 13 is in a recess in the block 11 and the other end is in a recess in a backing block 14. The backing block may be adjusted in and out for regulating the throw of the toggle by means of screws 15.

The slide 12 is connected by a link 16 with the forked upper end of an angle lever 17 that is pivoted on a stud 18. One end of this lever carries a roll 19 that is engaged by the cam 20 and the other end carries a roll 21 that is engaged by the cam 22, which cams are keyed on the cam shaft 23 of the machine. The engagement of the cam 20 with the roll 19 causes the lever and link to move the slide forward and straighten the toggle, and impart an inward movement to the outer member 9 of the cutter bar. This movement is short and powerful, its length and strength depending upon the relation of the toggle links as determined by the adjusting screws 15. The action of the cam 22 on the roll 21 through the lever and link returns the slide and breaks the toggle so that it will withdraw the inner member 9 of the cutter bar.

The inner member 8 of the cutter bar has a mortise 24 into which projects an arm 25 of the horizontally arranged bell crank lever 26. In the construction shown this bell crank is formed of two plates bolted together with a portion of

the arm fastened between them. Both plates and the arm are pivoted on a vertical stud 27, and the inner end of the arm is held so as to turn with the plates by a shear pin 28. Should accidental or excessive resistance be offered to the inward movement of the cutter bar member 8, the pin will break and allow the plates to continue to oscillate without actuating the cutter bar member. Connected by a universal joint 29 to the bell crank is one end of an adjustable link 30. The other end of this link is jointed to the forked upper end of an angle lever 31. This angle lever, which is similar in shape to the angle lever 17 and is pivoted on the shaft 18, carries a roll 32 that is engaged by a cam 33 and also a roll 34 that is engaged by a cam 35, which cams are keyed on the cam shaft 23. The engagement of the cam 33 with the roll 32 through the lever and link turns the bell crank so that the arm moves the inner member 8 of the cutter bar inward and the engagement of the cam 35 with the roll 34 causes the lever through the link to turn the bell crank in such manner that its arm draws back the inner member 8 of the cutter bar.

These cams are so timed that the powerful short action of the toggle moves the outer member of the cutter bar against the inner member of the cutter bar and causes the cutter to move across the cutting die and sever a section of the rod that has been fed in. When the piece has been severed the toggle action ceases and the bell crank continues the movement of the cutter so as to transfer the severed piece into line with the conforming tools. The cams are designed so that on the return movement, the slow moving outer section of the cutter bar is started back by the toggle while the rapidly moving inner section of the cutter bar is being brought back by the bell crank, in order that the rapidly moving inner member shall not engage with the outer member with a blow, both members moving in the same direction when they finally engage.

Cooperating with the cutting blade to ensure the square cutting of the blank and transfer of the blank to exact position between the tools, is a backing blade 36 attached to a bar 37 that is reciprocated through the side of the machine frame. The mechanism illustrated for reciprocating the backing blade bar is shown in and forms the subject of Patent No. 1,897,359 issued to me February 14, 1933.

Attached to the side of the frame is a bracket 38 that supports the outer end of the backing blade bar. Pivotally supported by this bracket, with one limb engaged with the backing blade bar, is a bell crank lever 39. The other limb of this lever is forked and connected by a universal joint 40 with one member of a yielding coupling 41. The other member of the coupling is connected by a universal joint 42 with the forked end of one limb of an angle lever 43 that has a roll 44 engaged by a cam 45 mounted on the cam shaft of the machine. The other limb of this lever has a roll 46 that is engaged by a cam 47 on the crank shaft. The former cam at the proper time, through the levers and coupling causes movement of the backing blade bar away from the cutting blade bar, and the latter cam at the proper time causes movement of the backing blade bar toward the cutting blade bar so that the backing blade will cooperate with the cutter blade for carrying the blank which has been cut from the rod into line with the tools, as specifically set forth in the patent referred to.

The invention claimed is:—

1. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, mechanism for imparting a conjoint cutting movement to all the members of the bar, and mechanism for imparting an independent transfer movement to the cutter carrying member of the bar.

2. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, mechanism for imparting a short powerful conjoint cutting movement to all the members of the bar, and mechanism for imparting a longer rapid independent transfer movement to the cutter carrying member of the bar.

3. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, mechanism for imparting a short powerful inward cutting movement to the entire bar, and mechanism for imparting a longer rapid inward transfer movement to the inner cutter carrying member of the bar.

4. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, cam actuated toggle mechanism for imparting a short powerful inward movement to the entire bar, and cam actuated bell crank mechanism for imparting a longer rapid inward movement to the inner cutter carrying member of the bar.

5. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, cam actuated toggle mechanism for imparting a short inward movement to the entire bar, means for adjusting the throw of the toggle, and mechanism for imparting a longer inward movement to the inner cutter carrying member of the bar.

6. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, mechanism for imparting a short powerful inward movement to the entire bar, cam actuated bell crank mechanism for imparting a longer inward movement to the inner cutter carrying member of the bar, and means for rendering the bell crank mechanism ineffective upon excessive resistance to the inward movement of the cutter carrying member of the bar.

7. Cut-off mechanism for heading machines, which comprises a reciprocatory cutter bar composed of a plurality of aligned separable members, cam actuated toggle mechanism for imparting a short inward movement to the entire bar, means for adjusting the throw of the toggle, cam actuated bell crank mechanism for imparting a longer inward movement to the inner cutter carrying member of the bar, and means for rendering the bell crank mechanism ineffective upon excessive resistance to the inward movement of the cutter carrying member of the bar.

8. Cut-off mechanism for heading machines which comprises a reciprocatory cutter bar composed of abutting but separable aligned inner and outer members, mechanism for imparting a short inward and outward movement to the outer member, and mechanism for imparting a longer independent inward and outward movement to the inner member, said mechanisms moving the bar members outward at the same time with a faster travel for the inner member than for the outer member.

9. Cut-off mechanism for heading machines

which comprises a reciprocatory cutter bar composed of abutting but separable aligned inner and outer members, cam actuated toggle mechanism for imparting an inward and outward movement to the outer member, and cam actuated bell crank mechanism for imparting an independent inward and outward movement to the inner member, said mechanisms moving the bar members outward at the same time with a faster travel for the inner member than for the outer member.

10. Cut-off mechanism for heading machines which comprises a reciprocatory cutter bar composed of abutting but separable aligned inner and outer members, mechanism for imparting a short inward movement to both the inner and outer members and independent outward movement to the outer member, and mechanism for continuing the inward and imparting the outward movement to the inner member, said mechanisms moving the bar members outward with a faster travel for the inner member than for the outer member.

11. Cut-off mechanism for heading machines which comprises a cutter bar composed of abutting but separable inner and outer members, the inner member carrying a cutter, mechanism operating upon the outer member for imparting an inward movement to both members, and mechanism operating upon the cutter carrying member for imparting an independent inward movement to said member.

12. Cut-off mechanism for heading machines which comprises a cutter bar composed of abutting but separable inner and outer members, the inner member carrying a cutter, mechanism operating upon the outer member for imparting a short inward movement to both members, and mechanism operating upon the cutter carrying member for imparting a longer independent inward movement to said member.

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