July 7, 1942. J. R. ROSENLEAF ET AL 2,288,921

CUTOFF MACHINE

Filed Nov. 22, 1940 6 Sheets-Sheet 2

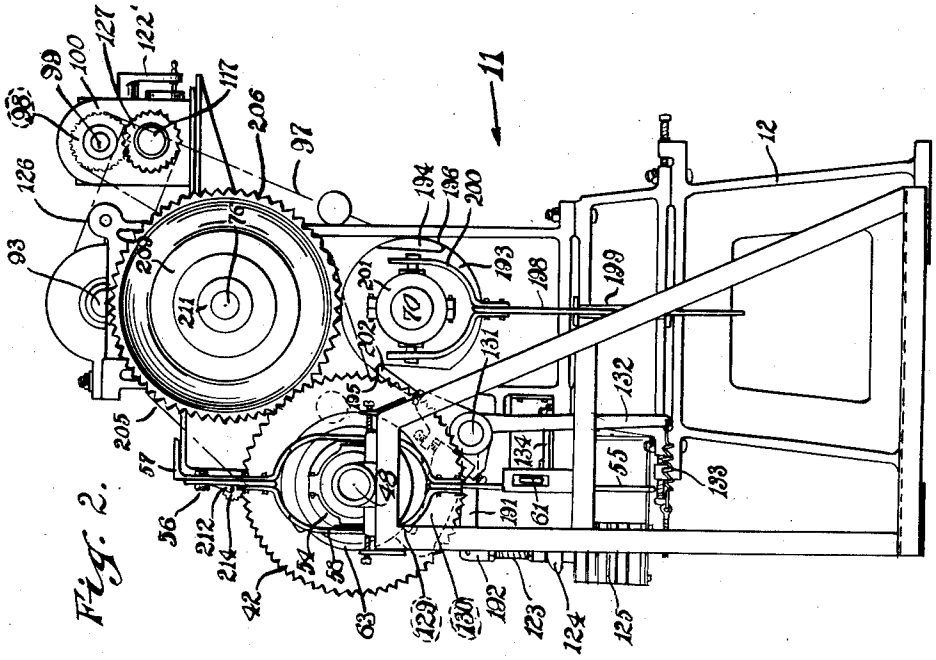


Fig. 2.

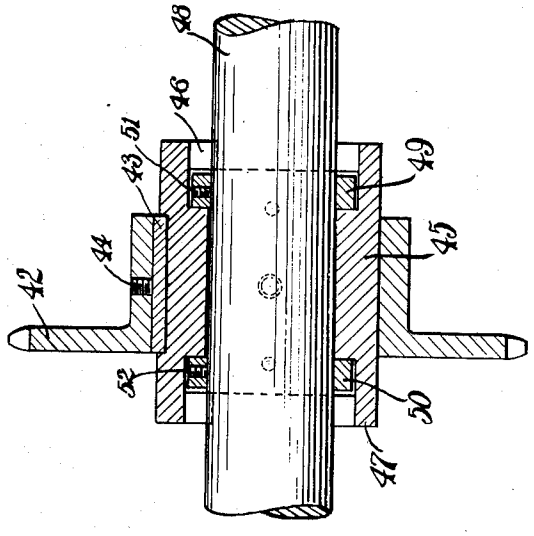


Fig. 7.

INVENTOR.
John R. Rosenleaf and
BY Emmett D. Benham,
Hood & Hahn
ATTORNEYS

July 7, 1942. J. R. ROSENLEAF ET AL 2,288,921

CUTOFF MACHINE

Filed Nov. 22, 1940 6 Sheets-Sheet 3

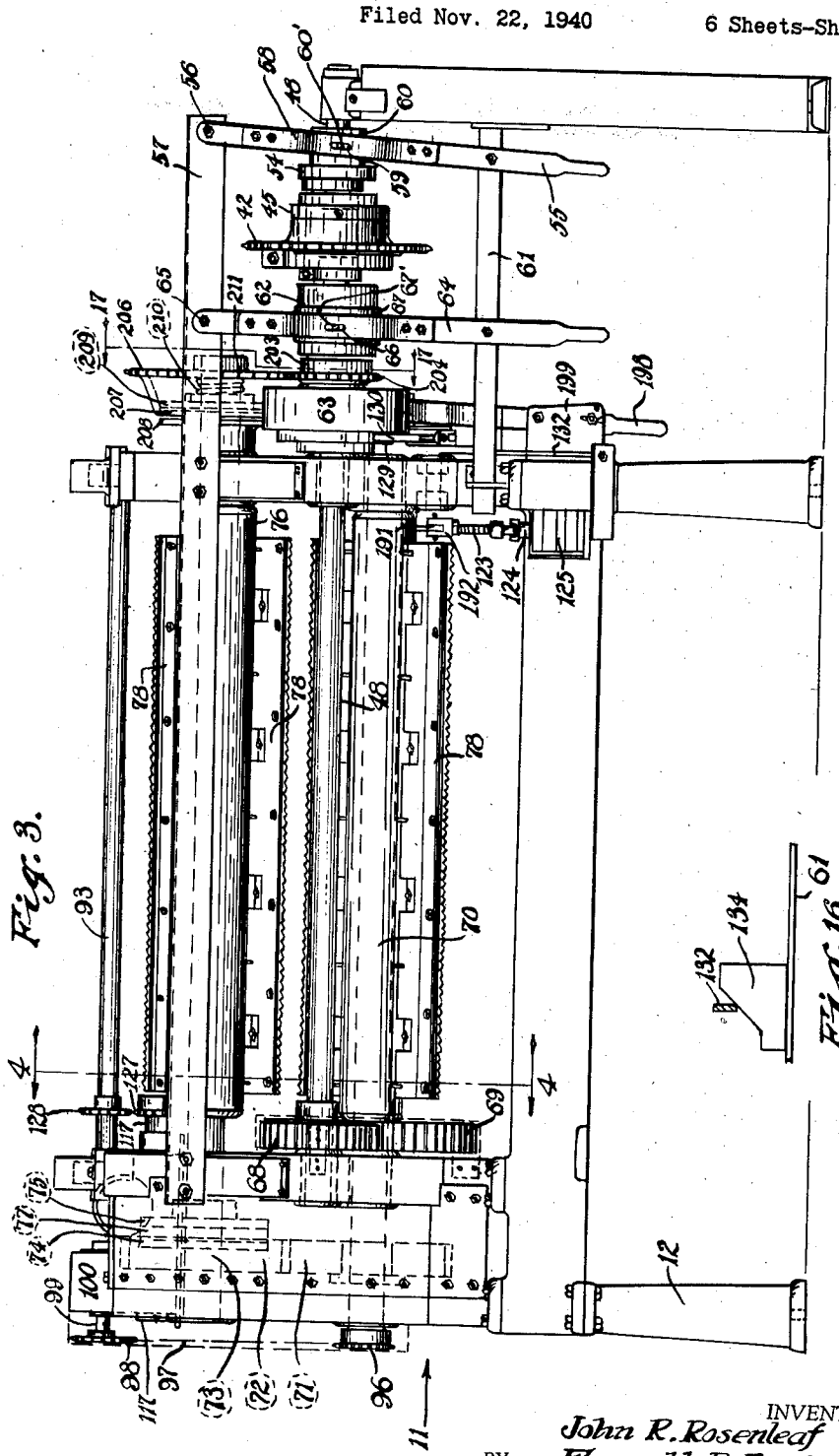


Fig. 3.

Fig. 16.

INVENTOR.
John R. Rosenleaf and
Emmett D. Benham,
BY Hood & Hahn
ATTORNEYS

July 7, 1942. J. R. ROSENLEAF ET AL 2,288,921

CUTOFF MACHINE

Filed Nov. 22, 1940 6 Sheets-Sheet 4

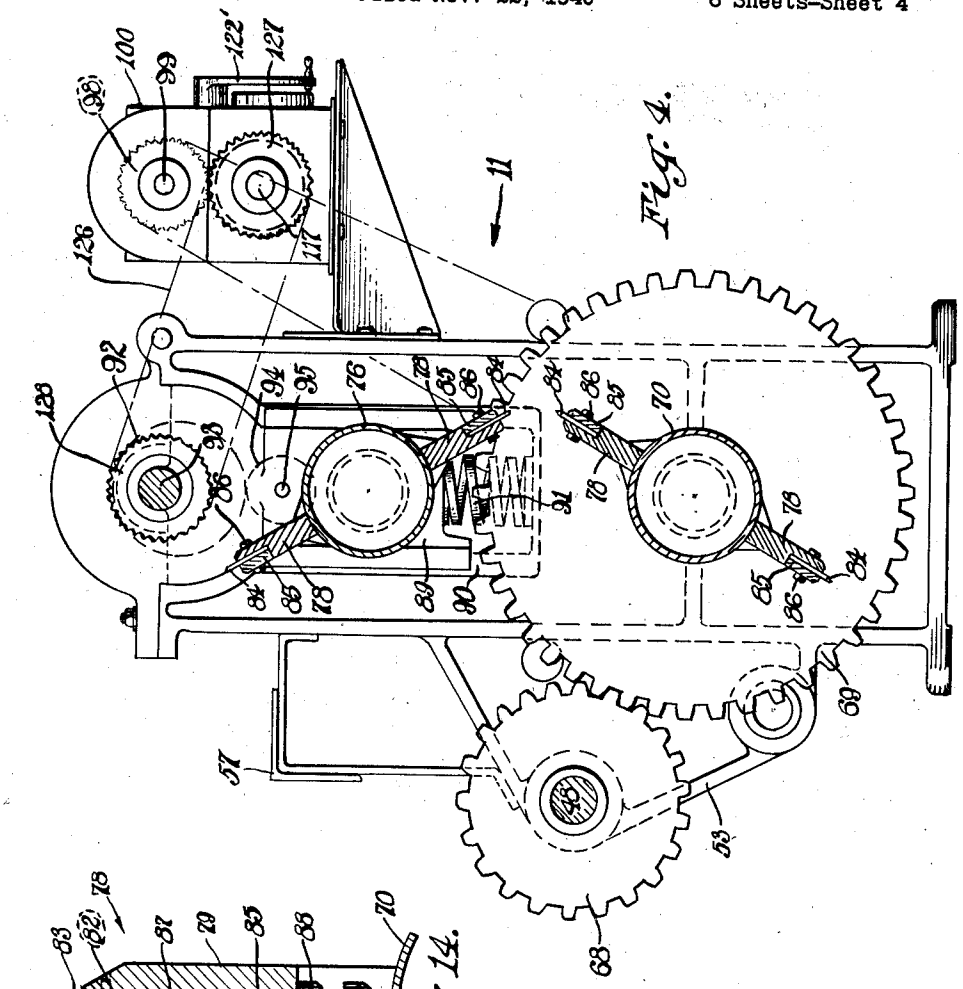


Fig. 4.

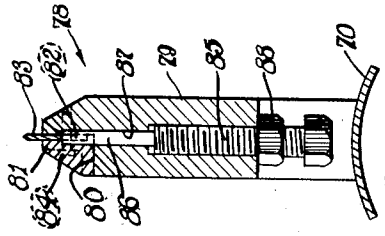


Fig. 14.

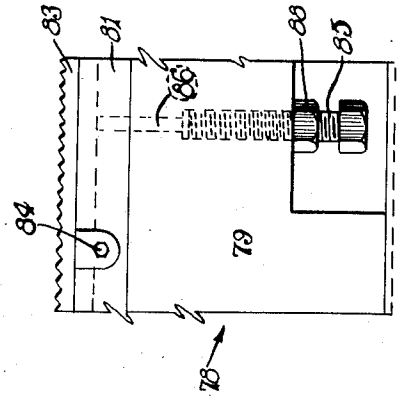


Fig. 15.

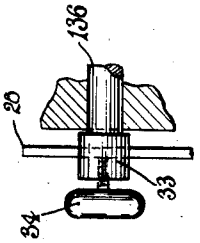


Fig. 13.

INVENTOR.
John R. Rosenleaf and
Emmett D. Benham,
BY Hoad & Kahn,
ATTORNEYS.

July 7, 1942. J. R. ROSENLEAF ET AL 2,288,921

CUTOFF MACHINE

Filed Nov. 22, 1940 6 Sheets-Sheet 5

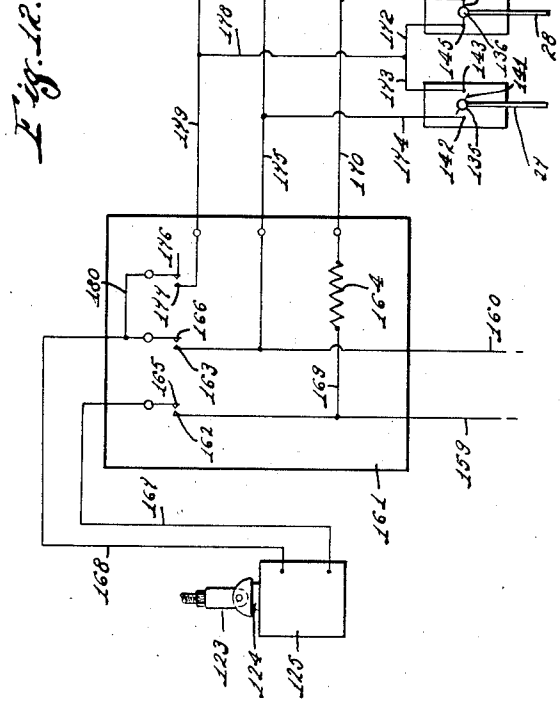


Fig. 12.

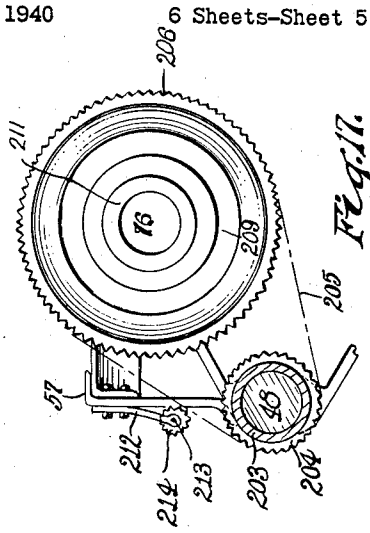


Fig. 11.

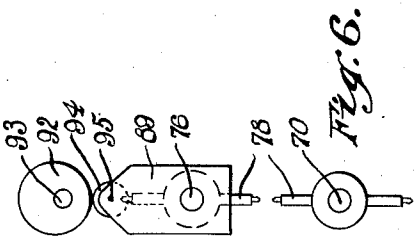


Fig. 6.

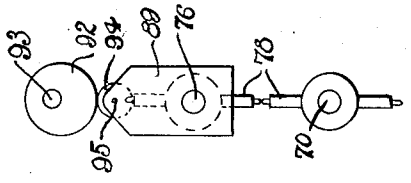


Fig. 5.

INVENTOR.
Emmett D. Benham and
BY John R. Rosenleaf,
Hood & Hahn.
ATTORNEYS.

July 7, 1942. J. R. ROSENLEAF ET AL 2,288,921

CUTOFF MACHINE

Filed Nov. 22, 1940 6 Sheets-Sheet 6

Fig. 8.

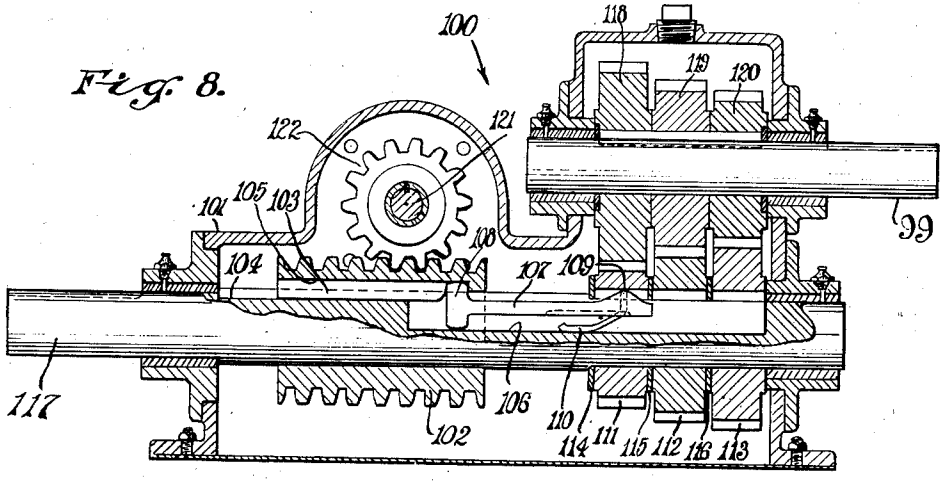
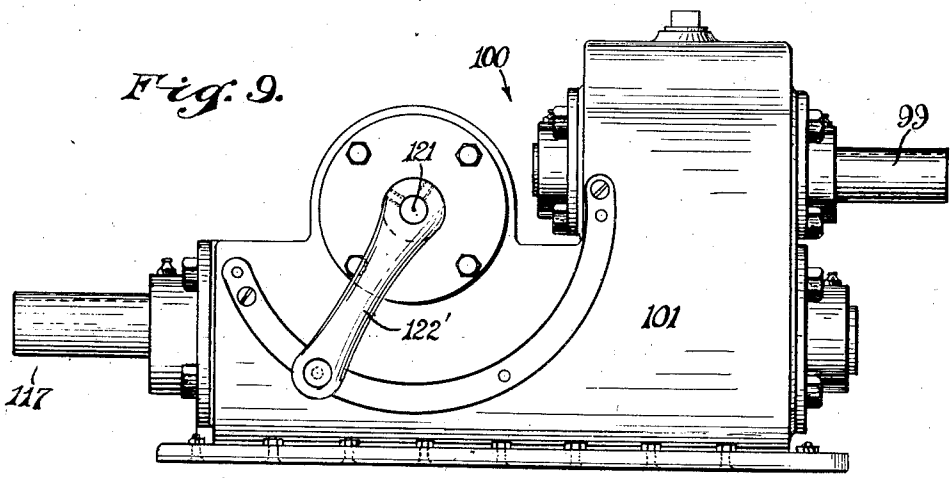


Fig. 9.



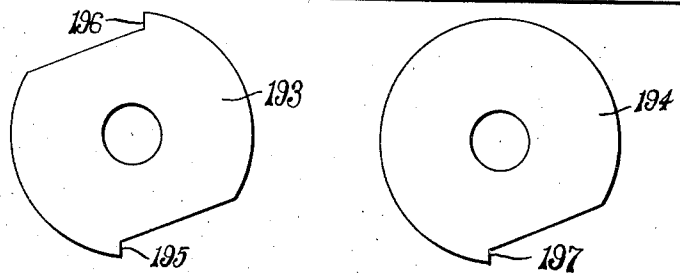


Fig. 10.

Fig. 11.

INVENTOR.
John R. Rosenleaf and
BY Emmett D. Benham,
Hood & Hohn.
ATTORNEYS

Patented July 7, 1942

2,288,921

UNITED STATES PATENT OFFICE

2,288,921

CUTOFF MACHINE

John R. Rosenleaf and Emmett D. Benham, Enterprise, Kans., assignors to The J. B. Ehrsam & Sons Manufacturing Company, Enterprise, Kans., a corporation of Kansas

Application November 22, 1940, Serial No. 366,530

34 Claims. (Cl. 164—68)

The present invention relates to mechanism for segregating a continuously moving stream of plaster board or the like into sections of desired and predetermined lengths. The broad idea of providing mechanism for transversely cutting or scoring or perforating such material during its flow is by no means new; but it is the primary object of the present invention to improve such mechanism in such a way as to permit the operator to pre-set his machine so that it will cut boards of any desired length (subject to a minimum limit), and will score or perforate the flowing stream at desired points between cuts, the machine being of such character that, by suitable pre-setting, either one or two intermediate markings may be formed at any desired locations with respect to the ends of the cut sections. Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a side elevation, somewhat diagrammatic in character, of the cutting and scoring mechanism and its controls;

Fig. 2 is an enlarged elevation, in greater detail, and taken from a point 180° removed from the position of Fig. 1;

Fig. 3 is an end elevation of the cutting and scoring mechanism, looking from the left-hand side of Fig. 2;

Fig. 4 is an enlarged transverse section taken substantially on the line 4—4 of Fig. 3, and looking in the direction of the arrows;

Figs. 5 and 6 are diagrammatic end elevations of the knife carriers, showing selective positions of the pre-setting cams;

Fig. 7 is an enlarged longitudinal section through one element of the driving train for the machine;

Fig. 8 is a longitudinal section through a selective speed transmission interposed in the camshaft driving train;

Fig. 9 is an elevation thereof;

Fig. 10 is an enlarged elevation of a stop cam;

Fig. 11 is a similar elevation of another stop cam;

Fig. 12 is a wiring diagram of the control mechanism;

Fig. 13 is an enlarged detail of one of the trip rods;

Fig. 14 is an enlarged transverse section through one of the knife bars;

Fig. 15 is a fragmental elevation thereof;

Fig. 16 is a fragmental plan view of an operative detail; and

Fig. 17 is a transverse section taken substantially on the line 17—17 of Fig. 3 and looking in the direction of the arrows.

Referring more particularly to the drawings, it will be seen that our cutter mechanism, indicated generally by the reference numeral 11, is mounted upon the base 12 immediately in advance of a control table, indicated generally by the reference numeral 13, so that the continuously moving stream of plaster board 14 or the like is fed to the cutter mechanism by a live roll conveyor 15 or the like and flows from the cutter mechanism onto an accelerating live roll conveyor 16 on the control table and continuing beyond said control table. The control table comprises a bed 17 mounted upon standards 18 and supporting said accelerating conveyor 16 and uprights 19 mounting a control mast 20 upon which are adjustably positioned three or more control units 21, 22, and 23. In the present illustration of my invention, I have shown a cutter mechanism carrying two sets of blades; but it will be obvious that a larger number of blades may be provided without departing from the present invention, the number of blades used being limited solely by the requirement that each blade shall clear the advancing stream of board before the next succeeding blade engages the stream. In the following description, I shall refer to the two-bladed mechanism, but it is to be understood throughout that a greater number of blades and controls may be provided, in a manner well understood by any one ordinarily skilled in the art, without departing from the present invention.

The control units 21, 22, and 23 are provided respectively with clamping elements 24, 25, and 26, whereby said units may be respectively secured to the mast 20 in any desired adjusted positions. The control unit 21 carries a pair of trip rods 27 and 28, the control unit 22 carries a pair of trip rods 29 and 30, and the control unit 23 carries a pair of trip rods 31 and 32. The mounting of each of these rods is identical, and therefore only one has been shown in Fig. 13. As is clearly shown therein, the rod 28 is secured in place in a bracket 33 by a wing screw 34, so that the rod 28 may, if desired, be raised out of the path of the advancing stream of board 14.

is longitudinally slidably mounted a shifting key 107 having a head 108 projecting into the rack keyway 105 and held against longitudinal movement with respect thereto between key 103 and the end of keyway 105. At its opposite end, the shifting key 107 is formed with a cammed head 109 for a purpose later to be explained, and a spring finger 110 constantly urges said head 109 outwardly of the keyway 106.

Three axially spaced pinions 111, 112, and 113, of progressively increasing diameters are axially immovably but rotatably mounted on shaft 117. Spacer rings 114, 115, and 116 are provided for a purpose which will appear hereinafter.

Fixedly mounted upon the input shaft 99 of the transmission are three gears 118, 119, and 120, of progressively decreasing diameters, constantly meshing, respectively, with the pinions 111, 112, and 113. Fixed to a rock shaft 121, mounted in suitable bearings in the casing 101, is a pinion 122 meshing with the rack 102, and a manipulating lever 122' is secured to an end of said shaft 121 outside the casing. Suitable indicia and/or holding means for cooperation with the lever 122' may be provided.

It will be obvious that, with the parts in the positions illustrated in Fig. 8, the pinion 111 is non-rotatably connected to the shaft 117 and will therefore transmit power from shaft 99 to shaft 117, at high speed, because of its engagement with gear 118. If, now, the shaft 121 is turned counter-clockwise, as viewed in Fig. 8, the right-hand cam face of head 109 will come into contact with ring 115, whereby said head will be moved inwardly against the tendency of spring 110 and will be disengaged from pinion 111. Continued movement in the same direction will permit the head 109, under the influence of spring 110, to snap into the key slot of pinion 112, thus connecting the pinion 112 to the shaft 117 to drive the same at intermediate speed, from gear 119. Still further movement of shaft 121 in the same direction will similarly cause head 109 to be disengaged from pinion 112 and engaged with pinion 113 to drive the output shaft 117 at low speed from gear 120. Thus, any one of the pinions 111, 112, and 113 may be selectively keyed to shaft 117 through the key 107.

Conversely, movement of the shaft 121 in a clockwise direction from the position of Fig. 8 will disengage the head 109 from the pinion 111 and move it into a position to the left of ring 114, wherein the output shaft 117 will not be driven. It is to be noted that the head 108 of key 107 will come into contact with the end of keyway 106 just before the right-hand end of key 107 leaves the ring 114, whereby the key 107 is held against disengagement from the keyway 106.

A chain 126 (Fig. 1) provides a driving connection between a sprocket 127 mounted on output shaft 117, and a sprocket 128 mounted on the cam shaft 93, so that the cam shaft 93 is driven with the output shaft 117, and at a speed corresponding to that of said shaft 117.

The Hilliard clutch 63 (see Figs. 2 and 3) includes, of course, a stop cam 129 with which cooperates a pawl 130. Said pawl 130 is fixed to a rock shaft 131 which is controlled by a lever 132 resiliently urged by spring 133 to a position in which the pawl 130 may engage the stop cam 129 to arrest rotation of the inner element of the clutch, and so of the countershaft 48.

Obviously, it is necessary to move the pawl 130 out of obstructing position when it is desired to drive the knife shafts 70 and 76 continuously; and to that end, the bar 61 (see Figs. 3 and 16) carries a cam plate 134, so shaped that, when the bar 61 is in its right-hand position, the spring 133 may hold the lever 132 in the position of Fig. 2; but that, when the bar 61 is moved to its left-hand position, the cam plate 134 will move the lever to the right, as viewed in Fig. 2, to shift the pawl 130 out of the path of the stop cam 129.

Thus, when the lever 55 is moved to the left, as viewed in Fig. 3, to engage clutch element 54 with clutch element 45, a rigid, continuous drive for the countershaft 48 is established, and the Hilliard clutch 63 is thrown out of action. With the machine so operating, and with lever 122' shifted clockwise to the limit of its movement, the machine will act to sever the board upon each half revolution of the knife shafts 70 and 76. Since, in the commercial embodiments of the invention, the perimetral distance between the two knives on each shaft is only two feet, one knife is ordinarily removed from each shaft for this type of operation, so that the board is cut into four-foot lengths. If it is desired to cut the board into longer lengths, with perforations between the ends of each severed section, the lever 122' is operated to shift the key 107 into driving engagement with one or another of the pinions 111, 112, and 113, whereby the cam shaft 93 will be driven to reciprocate the knife shaft 76 at the desired rate to produce perforations in the board at desired intervals. Thus, for instance, the transmission 100 may be properly proportioned so that, when the drive is through pinion 111 and two knives are used on each shaft, the machine will cut once and perforate twice in each cycle of cam shaft 93; when the drive is through pinion 112, and one knife only is used on each shaft, the machine will cut once and perforate once in each cycle of cam shaft 93; and when the drive is through pinion 113 and one knife only is used on each shaft, the machine will cut once and perforate twice in each cycle of cam shaft 93.

While four-foot board lengths are sometimes considered "standard" in this art, it is frequently desirable to produce board sections of greater lengths; and on those occasions, the intermittent operation of the present machine is brought into play.

Fixed to the rock shaft 131 is an arm 191, connected, through link 192 and adjusting bolt 123, with the core or plunger 124 of a solenoid 125 fixed to the machine frame; so that energization of the solenoid will result in counter-clockwise movement of the rock shaft 131 and its associated elements.

Energization of the solenoid 125 will rock the shaft 131 to shift the pawl 130 out of the path of the stop cam 129, thereby activating the clutch 63 to provide a drive through the shaft 48 and pinion 60 to the shafts 70 and 76. Upon subsequent de-energization of the solenoid 125, the pawl 130 will drop into position to engage the stop cam 129 to stop the driven side of the clutch 63 upon the completion of one revolution thereof.

Energization of the solenoid 125 is controlled through the wiring diagram of Fig. 12. Upon reference to that wiring diagram, it will be seen that the trip rod 27 is mounted upon a rocker 135 like the rocker 136 of Fig. 13. The rocker 135 carries a switch arm 141 normally out of

contact with terminals 142 and 143. The rocker 136 carries a switch arm 144 normally in contact with terminals 145 and 146. The trip rod 29 is mounted upon a rocker 137 which carries a switch arm 147 normally out of contact with terminals 148 and 149. Trip rod 30 is mounted upon a rocker 138 which carries a switch arm 150 normally in contact with terminals 151 and 152. Trip rod 31 is mounted upon a rocker 139 which carries a switch arm 153 normally out of contact with terminals 154 and 155; and trip rod 32 is mounted upon a rocker 140 which carries a switch arm 156 normally in contact with terminals 157 and 158.

A source of electrical energy is indicated by the line wires 159 and 160 which lead to a standard magnetic switch 161 having hot terminals 162 and 163. A magnet 164 within the switch mechanism is adapted, when energized, to shift contacts 165 and 166 respectively into contact with terminals 162 and 163 to complete an energizing circuit, through wires 167 and 168, for the solenoid 125. An energizing circuit for the magnet 164 is established, when the trip rod 27 is engaged by the advancing edge of the plaster board stream to swing the switch arm 141 into contact with terminals 142 and 143, from line wire 159 through wire 169, magnet 164, wire 170, wire 171, terminal 146, normally closed switch arm 144, terminal 145, wire 172, wire 173, terminal 143, switch arm 141, terminal 142, wire 174, and wire 175, back to line wire 160. The magnetic switch is thus shifted to establish the energizing circuit for the solenoid, and likewise to bring contact 176 into engagement with contact 177 to establish a holding circuit for the magnet 164, dependent solely upon the switch arm 144; from line wire 159 through wire 169, magnet 164, wire 170, wire 171, terminal 146, switch arm 144, terminal 145, wire 172, wire 178, wire 179, terminal 177, terminal 176, wire 180, wire 168, terminal 166, and terminal 163 to line wire 160. When the advancing edge of the board stream strikes the trip arm 28, that holding circuit is broken at the switch arm 144, and the solenoid will be de-energized; so that the pawl 130 will engage the stop cam 129 to arrest the driven element of the clutch 63 after one complete revolution thereof.

Energization of the solenoid will cause the shafts 70 and 76 to be driven through one-half revolution, according to the set up thus far described, whereby one set of knives 78 will be caused to operate upon the board and to move out of contact with the board. When the advancing stream of board now strikes the trip rod 29, the magnet 164 will be energized through a circuit traced from line wire 159 through wire 169, magnet 164, wire 170, wire 181, terminal 152, switch arm 150, terminal 151, wire 182, wire 183, terminal 149, switch arm 147, terminal 148, wire 184, and wire 175 to line wire 160 to shift the magnetic switch to energize the solenoid and to establish a holding circuit through the switch arm 150 and wire 185, wire 179, terminal 177, terminal 176, wire 180, wire 168, terminal 166, and terminal 163. When the advancing board strikes trip arm 30, the said holding circuit will be broken, and the solenoid will be again de-energized.

Similarly, when the board strikes trip arm 31, an energizing circuit for the magnet 164 will be established from line wire 159, wire 169, magnet 164, wire 170, wire 186, terminal 158, switch arm 156, terminal 157, wire 187, wire 188, terminal 155, switch arm 153, terminal 154, wire 189, and wire 175 to line wire 160 to shift the magnetic switch to energize the solenoid 125 and to establish a holding circuit therefor through the switch arm 156 and wire 190, wire 179, terminal 177, terminal 176, wire 180, wire 168, terminal 166, and terminal 163, to line wire 160. When the advancing board strikes trip arm 32, the said holding circuit will be broken and the solenoid will be again de-energized.

Of course, upon each energization of the solenoid 125, the rock shaft 131 will be shifted to disengage the pawl 130 from the stop cam 129, to start an operation of the shafts 70 and 76. Since the solenoid is again de-energized very promptly after such movement of the rock shaft 131, the spring 133 will throw the pawl 130 promptly back into position to block the cam 129, so that the shafts 70 and 76 will rotate only far enough to bring one pair of knives into and through cooperative relation with the moving stream of board.

To maintain accuracy in the distance between cuts or scores on the moving stream of board, it is essential that each operating movement of the knife shafts shall start at exactly the same point. A Hilliard clutch, of course, includes a resiliently-controlled lost motion, and, while its stopping position is reasonably accurate, it is not absolute. In the present machine, absolute accuracy of stopping position is essential if accurate board-section length is to be attained, and we have therefore provided means for attaining that absolute accuracy.

Mounted on the shaft 70 near the clutch 63 are two cams 193 and 194 (see Figs. 2, 10, and 11). The cam 193 is formed with two diametrically opposite stop faces 195 and 196, while the cam 194 is formed with only one stop face 197 which registers exactly with the stop face 195 of cam 193. The two cams are longitudinally spaced somewhat from each other on the shaft 70, and are dependently axially slidable on the shaft. A lever 198, pivoted on bracket 199 on the machine frame, terminates in a yoke 200 engaging oppositely projecting pins on a collar 201 operatively connected to the two cams 193 and 194 to shift the same axially on the shaft 70. In one extreme position of the lever 198, the cam 193 registers with a pawl 202 fixed on the rock shaft 131, and in the other extreme position of the lever 198, the cam 194 registers with said pawl 202. The parts are so proportioned that, in the operation of the machine, the stop cam 129 will come into engagement with the pawl 130 momentarily before the stop face 195 or 196 of cam 193 or the stop face 197 of cam 194 comes into engagement with the pawl 202.

The hub or outer member 203 of the Hilliard clutch 63 carries a sprocket 204 which is connected by a chain 205 to drive a sprocket 206. Said sprocket 206 is rotatably mounted on shaft 76; but its web portion 207 is positioned between two friction plates 208 and 209 keyed to said shaft. A coiled spring 210 bears against the plate 209; and the degree of frictional drag between the sprocket 206 and the shaft 76 is adjustable through the medium of a nut 211 threaded on the shaft 76 and constituting an abutment for the opposite end of the spring 210.

Because the shaft 76 is supported in the vertically-movable carriers 39, provision must be made for slack in chain 205 resulting from variations in the center distance between sprockets 204 and 206. Secured to frame-element 57 is a

leaf spring 212 (Fig. 17), the free end of which carries a trunnion 213 for an idler sprocket 214 positioned to bear against one run of chain 205 between the sprockets 204 and 206. The effect of the spring 212, urging the sprocket 214 always toward the right in Fig. 17, is to maintain the chain 205 resiliently taut at all times.

Thus, at all times when the clutch element 62 is in engagement with the clutch element 45, the sprocket 206 is exerting a frictional force tending to drive the machine forward. If, after the stop cam 129 engages the pawl 130, the machine tends to come to a stop short of the position of absolute accuracy, that frictional drag will drive the machine forward until one of the stop faces of the cam 193 or of the cam 194 (whichever is then in registry) engages the pawl 202. The speed at which the shaft 76 may be driven through the sprocket 206 is preferably somewhat less than the normal speed of the machine.

It will be clear from the above that, at times when the machine is under the control of the Hilliard clutch 63, the solenoid 125 will be energized whenever the advancing stream of board strikes one of the fingers 27, 29, or 31; and then will be promptly de-energized when the board stream strikes the corresponding finger 28, 30, or 32. Such action of the solenoid will result in a single rotation of countershaft 48 through clutch 63; and the machine will be stopped, after rotation of shafts 70 and 76 through exactly 180°, by the pawl 202. Of course, whenever the shafts 70 and 76 are driven, they are rotated at a speed such that the lineal velocity of the knives as they enter the board is substantially equal to the lineal velocity of the board.

When only one knife is carried on each cutter shaft, to cut, or to cut and score, plaster board in lengths of more than four feet, the lever 198 is shifted to move cam 194 into registry with stop pawl 202. When, now, the solenoid 125 is energized to rock shaft 131, the pawls 130 and 202 will be moved out of engagement with their respective cams, and the engagement of pawl 202 with the periphery of its cam 194 will hold the pawl 130 in retracted position as the shaft 48 completes, and continues beyond, a single revolution; so that the machine will continue to be driven through the Hilliard clutch until, as the knife shafts complete a full revolution, the cam 194 permits the pawl 202 to move inwardly to position the pawl 130 in the path of its cam stop face 129.

We claim as our invention:

1. In a cut-off machine including a pair of cooperatively associated rotary knives, a continuously-operating power source, means connecting said power source to drive the hub of a Hilliard-type clutch, the other member of said clutch being connected to drive said knives, a pawl operatively associated with said other clutch member to stop and hold said other clutch member against rotation, resilient means urging said pawl toward holding engagement with said other clutch member, and means for disengaging said pawl momentarily from said other clutch member including an electric motor connected to move said pawl, upon energization, out of retaining engagement with said other clutch member, an energizing circuit for said motor, a magnetic switch dominating said circuit and operable to close the same upon energization of its magnet, and means controlling energization of said magnet including an energizing circuit for said magnet, a normally open switch connected in said circuit, a normally closed switch connected in said circuit, said normally open switch being provided with a manipulator disposed in the path of material emerging from said cut-off machine and movable by such material to close said normally open switch to establish a circuit through said normally closed switch to energize said switch magnet, and said normally closed switch being provided with a manipulator disposed in the path of such material beyond said first-named manipulator and movable by such material to open said normally closed switch to break the energizing circuit for said switch magnet.

2. In a cut-off machine including a pair of cooperatively associated rotary knives, a continuously-operating power source, means connecting said power source to drive the hub of a Hilliard-type clutch, the other member of said clutch being connected to drive said knives, a pawl operatively associated with said other clutch member to stop and hold said other clutch member against rotation, resilient means urging said pawl toward holding engagement with said other clutch member, and means for disengaging said pawl momentarily from said other clutch member including an electric motor connected to move said pawl, upon energization, out of retaining engagement with said other clutch member, an energizing circuit for said motor, a magnetic switch dominating said circuit and operable to close the same upon energization of its magnet, and means controlling energization of said magnet including an energizing circuit for said magnet, a normally open switch connected in said circuit, a normally closed switch connected in said circuit, a control unit for said two last-named switches, said unit being adjustably mounted on a support extending substantially parallel with the path of movement of material emerging from said cut-off machine and carrying a manipulator for said normally open switch disposed in the path of material emerging from said cut-off machine and movable by such material to close said normally open switch to establish a circuit through said normally closed switch to energize said switch magnet, and carrying also a manipulator for said normally closed switch disposed in the path of such material beyond said first-named manipulator and movable by such material to open said normally closed switch to break the energizing circuit for said switch magnet.

3. In a cut-off machine including a pair of cooperatively associated rotary knives, a continuously-operating power source, means connecting said power source to drive the hub of a Hilliard-type clutch, the other member of said clutch being connected to drive said knives, a pawl operatively associated with said other clutch member to stop and hold said other clutch member against rotation, resilient means urging said pawl toward holding engagement with said other clutch member, and means for disengaging said pawl momentarily from said other clutch member including an electric motor connected to move said pawl, upon energization, out of retaining engagement with said other clutch member, an energizing circuit for said motor, a magnetic switch dominating said circuit and operable to close the same upon energization of its magnet, and means controlling energization of said magnet including a plurality of parallel energizing circuits for said magnet, each

including a normally open switch and a normally closed switch, a support extending substantially parallel with the path of movement of material emerging from said cut-off machine, and a plurality of control units, one for each of said last-named energizing circuits, adjustably mounted on said support, each of said control units carrying a manipulator for its normally open switch disposed in the path of material emerging from said cut-off machine and movable by such material to close its normally open switch to establish a circuit through its associated normally closed switch to energize said switch magnet, and each of said control units carrying also a manipulator for its normally closed switch disposed in the path of such material beyond said first-named manipulator and movable by such material to open its normally closed switch to break the energizing circuit for said switch magnet.

4. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a countershaft, gearing connecting said countershaft to drive said knives, a continuously-operating power source, a Hilliard-type clutch connecting said source to drive said countershaft, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, and means independent of said Hilliard-type clutch connecting said power source to drive said knives, said last-named means including a friction connection through which said power source continuously tends to drive said knives.

5. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, and means independent of said Hilliard-type clutch connecting said power source to drive said knives, said last-named means including a friction connection through which said power source continuously tends to drive said knives.

6. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, an element loosely mounted on the axis of one of said knives, a friction member fixed to rotate with said knife, means pressing said friction member into contact with said element, and means providing a driving connection between said source and said element.

7. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, an element loosely mounted on the axis of one of said knives, a friction member fixed to rotate with said knife, resilient means pressing said friction member into contact with said element, means for varying the degree of force exerted upon said friction member by said resilient means, and means providing a driving connection between said source and said element.

8. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, a friction member fixed on the axis of one of said knives, an element loosely mounted on said axis in juxtaposition to said friction member, a second friction member axially movable with respect to said axis but rotatably fixed thereto in juxtaposition to said element and spaced thereby from said first friction member, means exerting a pressure upon said second friction member and urging the same into contact with said element, and means providing a driving connection between said source and said element.

9. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, a friction member fixed on the axis of one of said knives, an element loosely mounted on said axis in juxtaposition to said friction member, a second friction member axially movable with respect to said axis but rotatably fixed thereto in juxtaposition to said element and spaced thereby from said first friction member, means exerting a resilient pressure upon said second friction member and urging the same into contact with said element, means for varying the degree of such resilient pressure, and means providing a driving connection between said source and said element.

10. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, a friction member fixed on the axis of one of said knives, an element loosely mounted on said axis in juxtaposition to said friction member, a second friction member axially movable with respect to said axis but rotatably fixed thereto in juxtaposition to said element and spaced thereby from said first friction member, a coiled spring mounted on said axis and bearing at one end against said second friction member, a nut adjustably mounted on said axis and forming an abutment for the other end of said spring, and means providing a driving connection between said source and said element.

11. In a cut-off machine, a frame, a first knife shaft journalled in said frame, a second knife shaft substantially paraxial with said first knife shaft, said second knife shaft being journalled in bearings reciprocable on lines substantially perpendicular with the axis of said first knife shaft, means for driving said first knife shaft, a gear

rotatable with said first knife shaft, a gear journalled on said frame and meshing with said first-named gear, and an Oldham coupling providing a driving connection between said second-mentioned gear and said second knife shaft.

12. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, said clutch including a stop cam, a second stop cam rotatable with one of said knives, a rock shaft, a pawl fixed to said rock shaft and movable, upon oscillation of said rock shaft, into and out of the path of said clutch stop cam, a second pawl fixed to said rock shaft and movable, upon oscillation of said rock shaft, into and out of the path of said second stop cam, said pawls being so associated that, when one is disposed in the path of its cam, the other is likewise disposed in the path of its cam, means providing a frictional drive connection between said power source and said one knife independent of said clutch, and means for shifting said rock shaft to move both said pawls simultaneously out of engagement with their respective cams.

13. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, said clutch including a stop cam, a rock shaft, a pawl fixed to said rock shaft and movable, upon oscillation of said rock shaft, into and out of the path of said clutch stop cam, a second stop cam and a third stop cam rotatable with, but axially reciprocable with respect to, the axis of one of said knives, a second pawl fixed to said rock shaft, means for selectively shifting said second and third stop cams into registry with said second pawl, said pawls being so associated that, when one is disposed in the path of its cam, the other is likewise disposed in the path of its cam, means providing a frictional drive connection between said power source and said one knive independent of said clutch, and means for shifting said rock shaft to move both said pawls simultaneously out of engagement with their respective cams.

14. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, a Hilliard-type clutch drivingly connected to said knives, and means for alternatively connecting said power source to drive said knives directly and to drive said knives through said Hilliard-type clutch.

15. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, a Hilliard-type clutch drivingly connected to said knives, said clutch including a stop cam and a pawl cooperative therewith, means resiliently urging said pawl into blocking relation with said cam, and means for alternatively connecting said power source to drive said knives directly and to drive said knives through said Hilliard-type clutch, said last-mentioned means including means for automatically shifting said pawl out of blocking relation with said cam upon connection of said power source to drive said knives directly.

16. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, a Hilliard-type clutch drivingly connected to said knives, said clutch including a stop cam and a pawl cooperative therewith, a second stop cam mounted to rotate with one of said knives, a second pawl cooperative therewith, means resiliently urging said pawls into blocking relation with their respective cams, and means for alternatively connecting said power source to drive said knives directly and to drive said knives through said Hilliard-type clutch, said last-mentioned means including means for automatically shifting said pawls out of blocking relation with their respective cams upon connection of said power source to drive said knives directly.

17. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a shaft drivingly connected to one of said knives, an element freely rotatable on said shaft, a continuously operating power source, drivingly connected to said element, a Hilliard-type clutch having its driven member drivingly connected to said shaft, means shiftable to clutch said element to the driving member of said Hilliard-type clutch, means shiftable to clutch said element directly to drive said shaft, said shiftable means being dependently movable to prevent simultaneous operative association thereof with said element.

18. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a shaft drivingly connected to one of said knives, an element freely rotatable on said shaft, a continuously-operating power source, drivingly connected to said element, a Hilliard-type clutch having its driven member drivingly connected to said shaft, said member including a stop cam, a pawl cooperative therewith, means resiliently urging said pawl into blocking relation with said cam, means shiftable to clutch said element to the driving member of said Hilliard-type clutch, means shiftable to clutch said element directly to drive said shaft, said shiftable means being dependently movable to prevent simultaneous operative association thereof with said element, and means, operable by movement of said shiftable means to position to clutch said element directly to said shaft, to shift said pawl out of blocking relation with said cam.

19. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a shaft drivingly connected to one of said knives, an element freely rotatable on said shaft, a continuously-operating power source, drivingly connected to said element, a Hilliard-type clutch having its driven member drivingly connected to said shaft, said member including a stop cam, a pawl cooperative therewith, a second stop cam mounted to rotate with one of said knives, a second pawl cooperative therewith, means resiliently urging said pawls into blocking relation with their respective cams, means shiftable to clutch said element to the driving member of said Hilliard-type clutch, means shiftable to clutch said element directly to drive said shaft, said shiftable means being dependently movable to prevent simultaneous operative association thereof with said element, and means, operable by movement of said shiftable means to position to clutch

said element directly to said shaft, to shift said pawls out of blocking relation with their respective cams.

20. In a cut-off machine, a frame, a pair of cooperatively associated rotary knives journalled in said frame, gearing connecting said knives to rotate equally and oppositely, a countershaft journalled in said frame, a continuously operating source of power, an element axially fixed on, but rotatable with respect to, said countershaft, clutch surfaces formed on the opposite ends of said element, means providing a driving connection between said source and said element, a clutch member slidably keyed to said shaft, a lever for moving said member into and out of clutched relation with said element, a Hilliard-type clutch having its driven member drivingly connected to said countershaft, a clutch member slidably keyed to the driving member of said Hilliard-type clutch, a lever for moving said last-mentioned clutch member into and out of clutched relation with said element, and means connecting said levers for dependent movement to prevent simultaneous engagement of said clutch members with said element.

21. In a cut-off machine, a frame, a pair of cooperatively associated rotary knives journalled in said frame, gearing connecting said knives to rotate equally and oppositely, a countershaft journalled in said frame, a continuously-operating source of power, an element axially fixed on, but rotatable with respect to, said countershaft, clutch surfaces formed on the opposite ends of said element, means providing a driving connection between said source and said element, a clutch member slidably keyed to said shaft, a lever for moving said member into and out of clutched relation with said element, a Hilliard-type clutch having its driven member drivingly connected to said countershaft, a clutch member slidably keyed to the driving member of said Hilliard-type clutch, a lever for moving said last-mentioned clutch member into and out of clutched relation with said element, means connecting said levers for dependent movement to prevent simultaneous engagement of said clutch members with said element, the driven member of said Hilliard-type clutch being provided with a stop cam, a pawl movable into and out of the path of said cam, and cam means movable by operation of said levers, and operable, upon movement of said first-mentioned slidable clutch member into clutched relation with said element, to shift said pawl out of the path of said cam.

22. In a cut-off machine, a frame, a pair of cooperatively associated rotary knives journalled in said frame, gearing connecting said knives to rotate equally and oppositely, a countershaft journalled in said frame, a continuously operating source of power, an element axially fixed on, but rotatable with respect to, said countershaft, clutch surfaces formed on the opposite ends of said element, means providing a driving connection between said source and said element, a clutch member slidably keyed to said shaft, a lever for moving said member into and out of clutched relation with said element, a Hilliard-type clutch having its driven member drivingly connected to said countershaft, a clutch member slidably keyed to the driving member of said Hilliard-type clutch, a lever for moving said last-mentioned clutch member into and out of clutched relation with said element, means connecting said levers for dependent movement to prevent simultaneous engagement of said clutch members with said element, the driven member of said Hilliard-type clutch being provided with a stop cam, a pawl movable into and out of the path of said cam, a second stop cam mounted to rotate with one of said knives, a second pawl movable into and out of the path of said second cam, and cam means movable by operation of said levers and operable, upon movement of said last-mentioned slidable clutch member into clutched relation with said element, to shift said pawls out of the paths of their respective cams.

23. In a cut-off machine, a first knife shaft, a second knife shaft, one of said shafts being bodily shiftable to vary the center distance between said shafts, a countershaft, a source of power, means providing a driving connection between said source and said countershaft, a sprocket on said countershaft, a sprocket on said shiftable shaft, a chain providing a driving connection between said sprockets, an idler sprocket, and a leaf spring anchored adjacent one end and providing a journal mounting for said idler sprocket adjacent its opposite end, said spring pressing said idler sprocket resiliently against said chain at a point between said sprockets.

24. In a cut-off machine including a pair of cooperatively associated rotary knives, a continuously-operating power source, means connecting said power source to drive the input element of a Hilliard-type clutch, the output element of said clutch being connected to drive said knives, a pawl associated with said output element and biased toward a position to stop and hold said output element against rotation, and means momentarily operative upon said pawl to move the same out of such stopping position and then promptly to release said pawl.

25. In a cut-off machine including a pair of cooperatively associated rotary knives, a continuously-operating power source, means connecting said power source to drive the input element of a Hilliard-type clutch, the output element of said clutch being connected to drive said knives, a pawl associated with said output element and biased toward a position to stop and hold said output element against rotation, and means momentarily operative upon said pawl to move the same out of such stopping position and then propmtly to release said pawl, said last-named means being actuable by movement of material through said machine.

26. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said shafts to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, a stop cam rotatable with one of said knives, a pawl cooperable with said cam, at times, to stop said knives exactly at a predetermined point, and means independent of said Hilliard-type clutch connecting said power source to drive said knives, said last-named means including a friction connection through which said power source continuously tends to drive said knives, said last-named means being geared to drive said knives at a speed less than the speed at which said first-named driving means drives the same.

27. In a cut-off machine, a pair of cooperatively associated rotary knives, gearing connecting said knives to rotate equally and oppositely, a continuously-operating power source, means including a Hilliard-type clutch connecting said source to drive said knives, said clutch including

a stop cam, a rock shaft, a pawl fixed to said rock shaft and movable, upon oscillation of said rock shaft, into and out of the path of said clutch stop cam, a second stop cam and a third stop cam rotatable with, but axially reciprocable with respect to, the axis of one of said knives, a second pawl fixed to said rock shaft, means for selectively shifting said second and third stop cams into registry with said second pawl, said pawls being so associated that, when one is disposed in the path of its cam, the other is likewise disposed in the path of its cam, means providing a frictional drive connection between said power source and said one knife independent of said clutch, and means for shifting said rock shaft to move both said pawls simultaneously out of engagement with their respective cams, said second stop cam being formed with two stop faces, exactly 180° removed from each other, and said third stop cam being formed with one stop face only, said one stop face of said third cam registering exactly with one stop face of said second cam, and the portion of said third cam registering with the other stop face of said second cam being shaped to hold said first pawl out of the path of the stop face of said first cam.

28. In a cut-off machine, a pair of cooperatively associated knives, gearing connecting said knives to move substantially equally and oppositely, a continuously-operating power source, clutch means at times connecting said source to drive said knife, stop means cooperating with said knives, at times, to stop said knives exactly at a predetermined point, and means independent of said clutch means connecting said power source to drive said knives, said last-named means including a friction connection through which said power source continuously tends to drive said knives.

29. In a cut-off machine, a pair of cooperatively associated knives, gearing connecting said knives to move substantially equally and oppositely, a continuously-operating power source, means including a single-revolution clutch at times connecting said source to drive said knives, stop means cooperating with said knives, at times, to stop said knives exactly at a predetermined point, and means independent of said clutch connecting said power source to drive said knives, said last-named means including a friction connection through which said power source continuously tends to drive said knives.

30. In a cut-off machine, a pair of cooperatively associated knives, gearing connecting said knives to move substantially equally and oppositely, a continuously-operating power source, a single-revolution clutch drivingly connected to said knives, and means for alternatively connecting said power source to drive said knives directly and to drive said knives through said clutch.

31. In a cut-off machine, a pair of cooperatively associated knives, gearing connecting said knives to move substantially equally and oppositely, a continuously-operating power source, a drive train including clutch means at times connecting said source to drive said knives, an alternative drive train between said source and said knives by-passing said clutch means, and means shiftable to render said respective drive trains alternatively effective.

32. In a cut-off machine, a first knife shaft, a second knife shaft, one of said shafts being bodily shiftable to vary the center distance between said shafts, a source of power, means, including an endless flexible member, providing a driving connection between said power source and said shiftable shaft, idler means bearing on said flexible element, and a leaf spring anchored adjacent one end and supporting said idler means adjacent its opposite end, said spring pressing said idler means resiliently against said flexible element at a point between said shiftable shaft and a member drivingly connected thereto by said flexible element.

33. In a cut-off machine, a frame, a first knife shaft journalled in said frame, a second knife shaft substantially paraxial with said first knife shaft, said second knife shaft being journalled in bearings reciprocable on lines substantially perpendicular with the axis of said first knife shaft, means for driving said first knife shaft, a gear rotatable with said first knife shaft, a gear journalled on said frame and meshing with said first-named gear, an Oldham coupling providing a driving connection between said second-mentioned gear and said second knife shaft, and means for reciprocating said knife shaft bearings at speeds variously related to the speed of rotation of said knife shafts.

34. In a cut-off machine, a pair of cooperatively associated knives, gearing connecting said knives to move substantially equally and oppositely, a continuously operated power source, a drive train including a clutch, a drive train by-passing said clutch, said drive train alternatively connecting said power source to drive said knives, and each of said drive trains consisting solely of elements incapable of relative slippage.

JOHN R. ROSENLEAF.
EMMETT D. BENHAM.

July 7, 1942. J. R. ROSENLEAF ET AL 2,288,922

CUTOFF MACHINE ADJUSTMENT

Filed Aug. 27, 1941

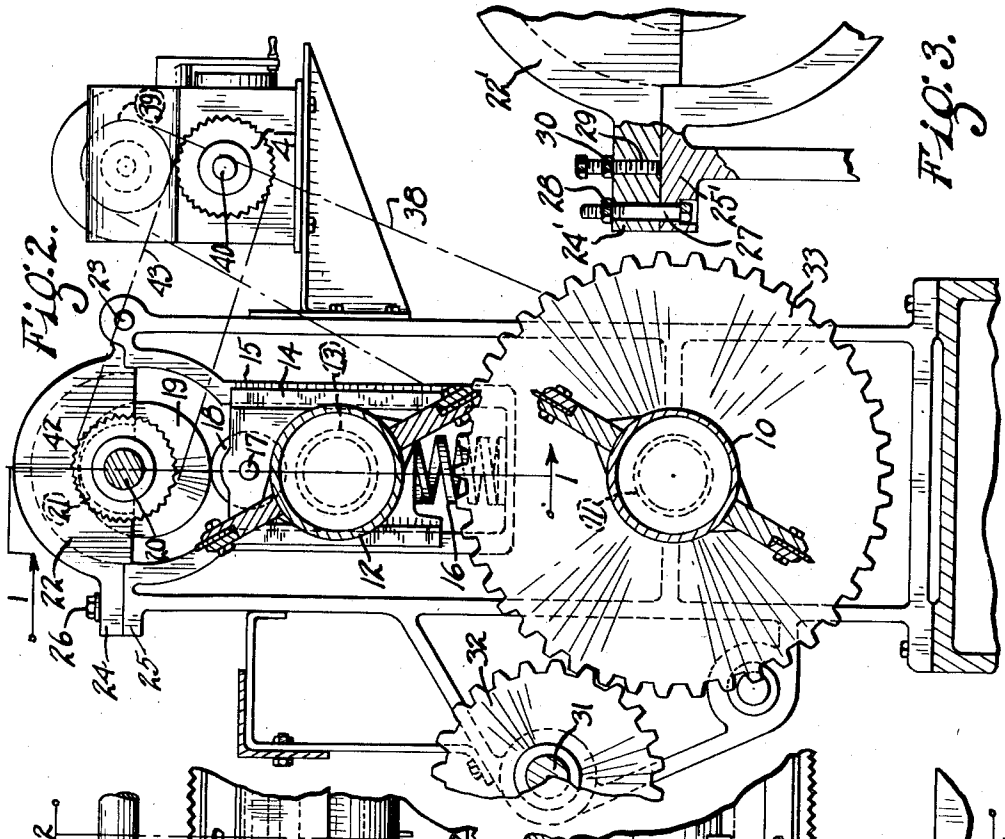


Fig. 2.

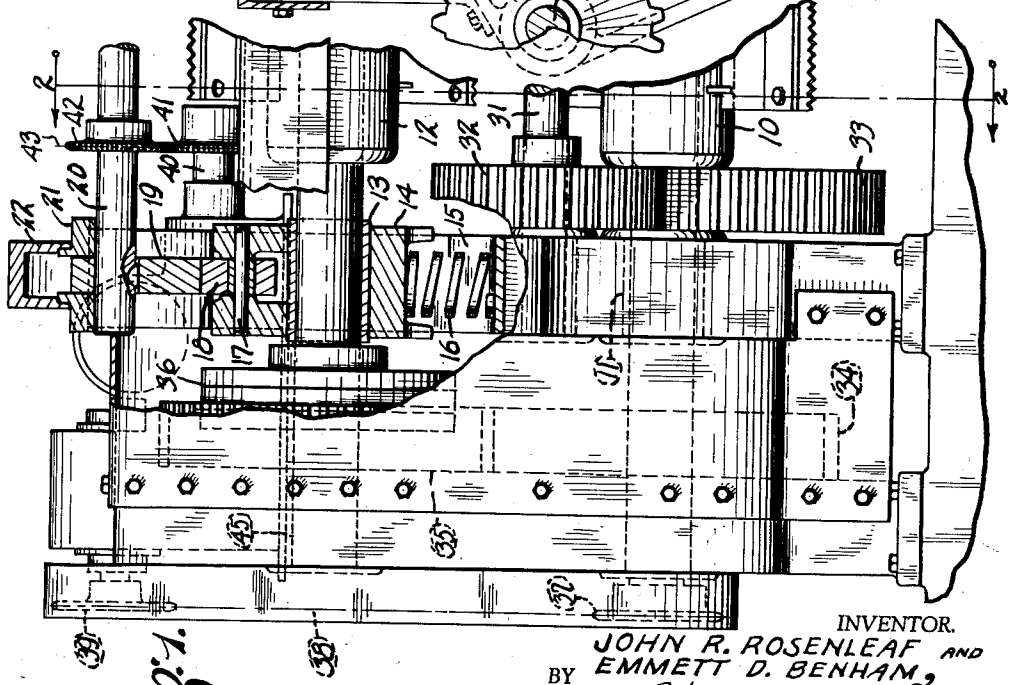


Fig. 1.

Fig. 3.

INVENTOR.
JOHN R. ROSENLEAF AND
EMMETT D. BENHAM,
BY Hood & Hahn.
ATTORNEYS