

July 8, 1941.

B. A. OLSEN

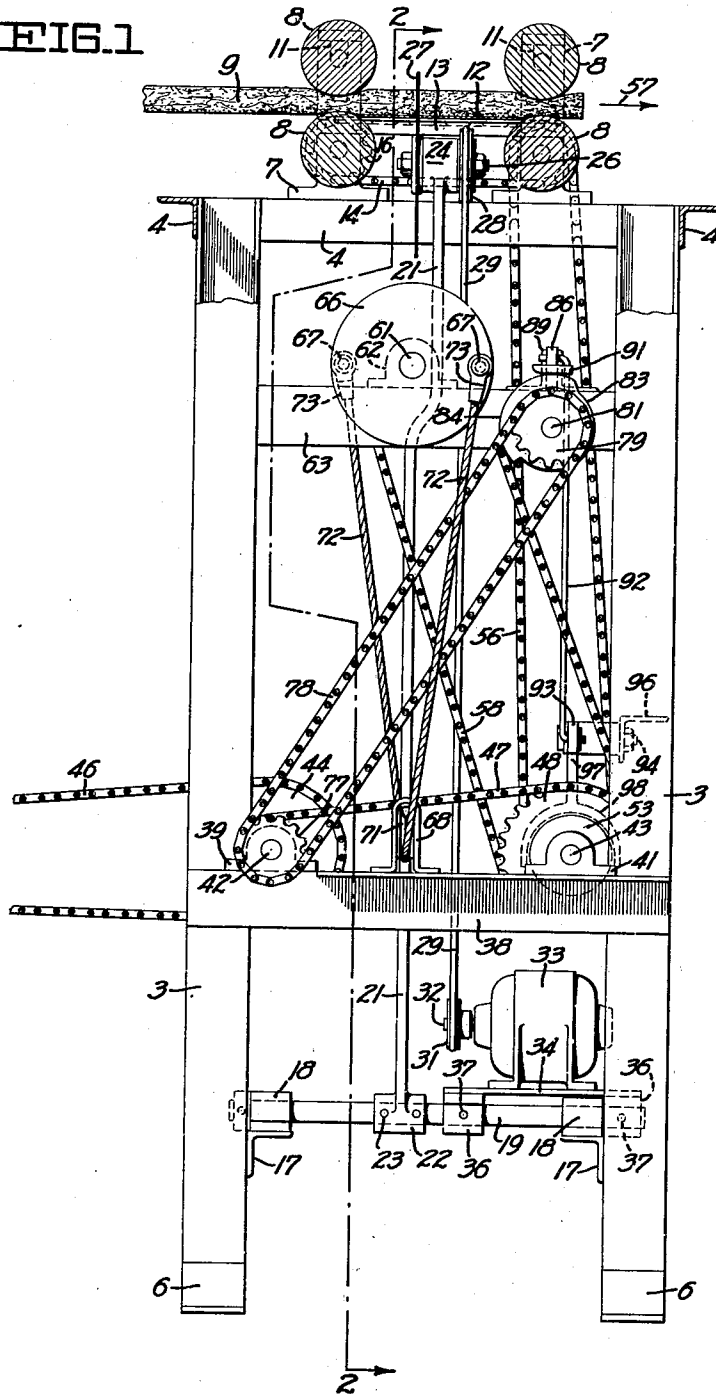
2,248,115

CUTOFF MACHINE

Filed July 29, 1940

2 Sheets-Sheet 1

FIG. 1



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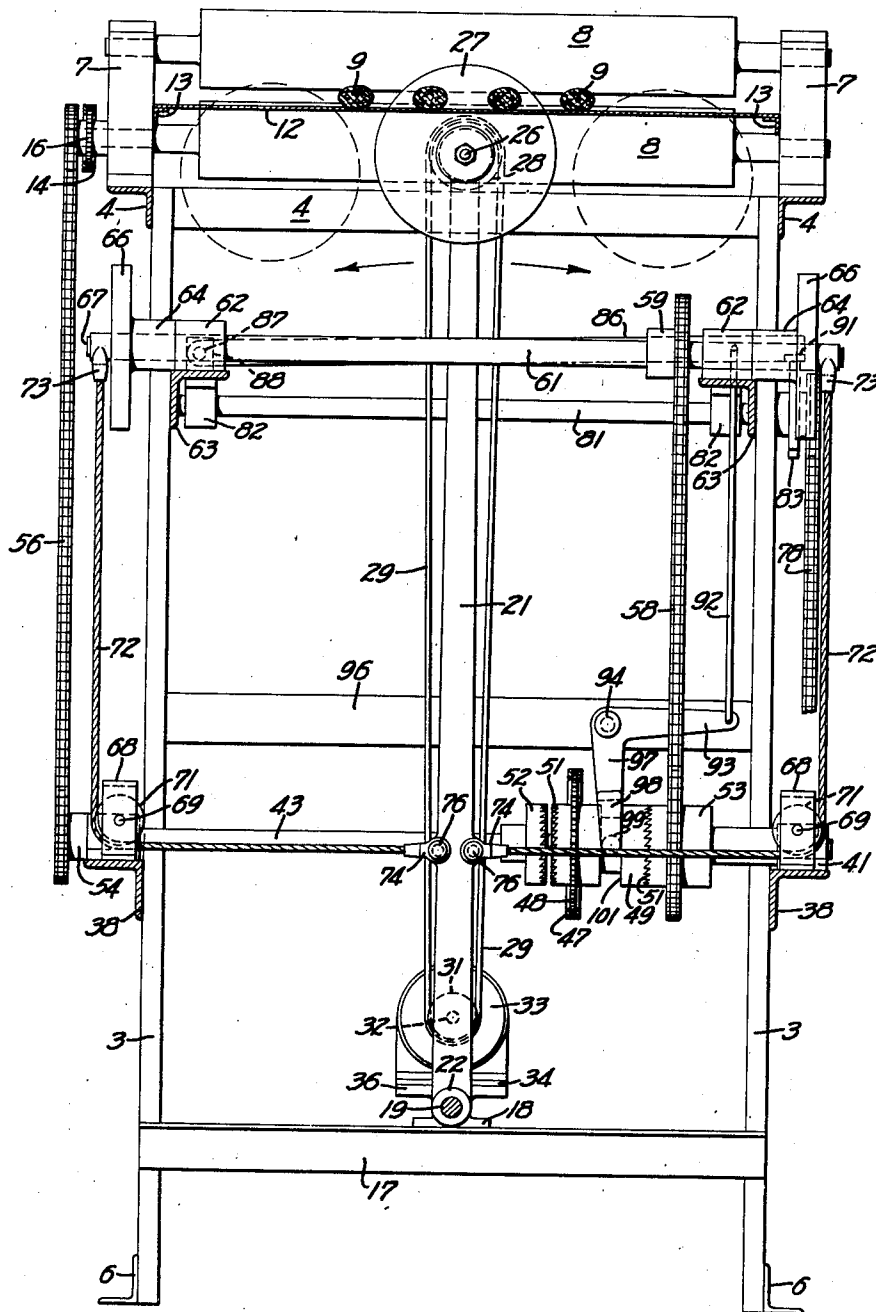


FIG. 2

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UNITED STATES PATENT OFFICE

2,248,115

CUTOFF MACHINE

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Application July 29, 1940, Serial No. 348,238

5 Claims. (Cl. 164-76)

This invention relates to devices for cutting strip or sheet material into pieces of predetermined size.

It is an object of the invention to provide a machine particularly adapted to cutting felted cotton or other fibers which are very difficult to cut rapidly enough for quantity production with the ordinary shear devices.

Another object of the invention is to provide a cut-off machine which will not become clogged by accumulations of loose fibers as in the case of shear devices.

A further object of the invention is to provide a cut-off machine which may be operated for extended periods of time without the necessity of shutting down the machine to replace or sharpen the cutters.

The invention possesses other objects and features of advantage which, together with the foregoing, will be specifically brought out in the detailed description of the invention hereunto annexed. It is to be understood that the invention is not to be limited to the specific embodiment thereof herein shown and described as various other modifications thereof may be employed within the scope of the appended claims.

Referring to the drawings:

Figure 1 is a side elevational view of the cut-off machine of my invention. A portion of the view is broken away and other parts are shown in vertical section so as to more clearly disclose the construction.

Figure 2 is a vertical sectional view of the machine. The plane in which the view is taken is indicated by the line 2-2 of Figure 1.

In detail, the machine comprises a frame having a plurality, preferably four, of vertical corner posts 3 which are secured together in horizontally spaced relation by upper cross-members 4 attached, in any suitable manner, to the extreme upper ends of the posts 3. Clips 6, attached to the lower ends of the posts 3, are provided for mounting the frame on a floor or other supporting surface.

Mounted on and rising from a parallel pair of the upper cross-members 4 are spaced pairs of bearing brackets 7 in which are journaled vertically and horizontally spaced pairs of feed rolls 8 between which the continuous strip or sheet 9 of material to be cut off is passed. The shaft of the upper roll 8 of each pair thereof is disposed in vertically extended slots 11 formed in each bearing bracket 7 so that the upper rolls float and are free to move in a vertical direction. This imposes the entire weight of the up-

per rolls on the material 9 pressing the latter against the periphery of the lower roll so that tractional engagement is had between the material 9 and the lower rolls. Thus, when the lower rolls are forcibly rotated, the material 9 will be advanced. A plate 12, positioned between the pairs of rolls 8 and engaging the bottom of the stretch of material 9 extending between the pairs of rolls so as to prevent downward sag of the material, is mounted by angle clips 13 on the bearing brackets 7; and a chain 14 meshing with sprockets 16, carried by the shafts of the lower roll 8 of each pair thereof, connect the rolls for synchronous rotation together so that the portion of the material 9 extending between the pairs of rolls will be kept desirably taut during advancement of the material.

Means is provided, movable transversely of the path of movement of the material 9, for cutting the material into pieces of a predetermined length. Located adjacent the lower end of the frame, and attached to opposite pairs of the corner posts 3, is a pair of horizontal cross-members 17 each of which carries, intermediate its ends, a pillow block 18 in the aligned bores of which a pivot shaft 19 is journaled. An elongated vertically extending arm 21 is provided having, at its lower end, a hub 22 encircling and secured by pins 23 to the pivot shaft 19, and at its upper end a hub 24 positioned just below the plate 12. A spindle 26, journaled in the hub 24, has a disk cutter 27 mounted on one end thereof and a peripherally grooved pulley 28 mounted on the other end thereof. A circular belt 29, engaging the pulley 28, extends downwardly paralleling the arm 21 and engages a peripherally grooved pulley 31 carried by the shaft 32 of an electric motor 33 which is mounted on a plate 34 carried by brackets 36 mounted on the pivot shaft 19 by pins 37. The arm 21 may be oscillated, about the axis of the shaft 19 as a center, so as to move the cutter disk 27 transversely of the path of movement of the material 9 between the limits indicated by the dotted circles of Figure 2, which represent the extreme positions of the cutter disk, and sever the material 9 into pieces of the desired length. The cutter disk 27 of course extends sufficiently above the upper surface of the material 9 so that the material will be cut completely through during each pass of the cutter disk and the plate 12 is provided with a long slot through which the cutter disk extends.

The material 9, which the cut-off machine of

my invention is designed for operation upon, is composed of loosely felted vegetable or mineral fibers such as cotton or shredded asbestos or a mixture of the two. This material, as shown in the drawings, is rolled or formed into substantially cylindrical rope-like strips in a machine such as that disclosed in my prior application, Serial No. 348,236, filed July 29, 1940, short sections of which are then cut off for use as stemming wads for plugging earth bores in blasting operations. The so-called rope, after being shaped to its cylindrical form, is given a surface coating of material which forms an outer crust thereon serving to hold the surface fibers in place and to help maintain the cylindrical shape of the finished wad. The usual cooperative shearing knives are not satisfactory for cutting off material of the type described above for the reasons that the knives cannot be operated sufficiently fast to maintain a desired production speed, loose fibers may accumulate in the knives and jam the latter, the pinching together of the ends of the finished wad by the knives is highly undesirable since it destroys the cylindrical form of the wad, and the loss of time attendant upon having to frequently shut down the machine to replace or sharpen the knives is considerable and materially lowers the output of the plant. In the machine of my invention the use of a circular cutter obviates these undesirable features by permitting the machine to be run at high speed, preserving the cylindrical shape of the finished wads and by extending the runs of the machine between sharpenings or replacements of the cutter disk.

Means is provided for driving the feed rolls 8 so as to advance the material 9 in a direction longitudinally thereof. Mounted on the corner posts 3, above and positioned transversely of the cross-members 17, is a pair of horizontal cross members 38 upon which are mounted spaced pairs of pillow blocks 39 and 41, journaling, respectively a jackshaft 42 and an intermediate shaft 43. The jackshaft 42 carries a sprocket 44 with which a chain 46, driven by a suitable prime mover such as an electric motor, not shown, is in mesh. The jackshaft also carries a smaller sprocket meshing with an endless chain 47 which engages the sprocket 48 carried by a sleeve 49 journaled on and slidable axially of the intermediate shaft 43. The sleeve 49, at each end thereof, is provided with radial clutch teeth 51 which may be brought into mesh, when the sleeve is reciprocated, axially in opposite directions, with complementary clutch teeth formed on a hub 52, which is keyed or otherwise secured to and for rotation with the shaft 43, and on a collar 53 which is journaled on the shaft 43. The extreme end of the intermediate shaft 43 is fitted with a sprocket 54 which meshes with an upwardly extending endless chain 56 engaging a sprocket carried by the shaft of one of the lower feed rolls 8. It will be seen that when the jackshaft 42 is being rotated by the prime mover and the sleeve 49 is moved axially so that the clutch teeth at one end thereof engage the clutch teeth of the hub 52, the sleeve 49 and the intermediate shaft 43 will be secured for rotation together with the result that the chain 56 will rotate the interconnected lower feed rolls 8 thereby advancing the material 9 longitudinally in the direction of the arrow 57. This longitudinal feed of the material 9 will continue as long as the sleeve 49 and hub 52 are engaged and may be stopped instantaneously by moving the sleeve 49 so as to dis-

engage the clutch teeth thereof from the teeth of the hub.

Means is provided for moving the arm 21 so as to move the cutter disk 27 transversely of the path of movement of the material 9. Mounted on the collar 53 is a sprocket engaging an upwardly extending endless chain 58 which meshes with a sprocket 59 fixed for rotation with a countershaft 61 journaled in pillow blocks 62 which are carried by horizontal cross-members 63 mounted on the corner posts 3. Each end of the countershaft 61 is fitted with a crank comprising a hub 64, carried by the shaft, having a disk flange 66 thereon on which is fixed a crank pin 67 which is radially offset with respect to the axis of the shaft 61. The two crank pins 67 are diametrically opposed as will be seen in Figure 1. Mounted on the cross-members 38, and coinciding with a vertical plane passing through the axis of the countershaft 61, are brackets 68 each carrying a shaft 69 upon which is journaled a peripherally grooved pulley 71. Flexible steel cables 72 pass under and engage each of the pulleys 71 and have their upper ends connected, by pitman members 73 with the crank pins 67, and their lower ends, by clevised pitman members 74, with pins 76 secured in the arm 21. Referring to Figure 2, it will be seen that when the sleeve 49 is shifted, axially of the intermediate shaft 43, to the right, the toothed end of the sleeve will be engaged with the mating clutch teeth on the collar 53 thereby securing the latter for rotation with and by the intermediate shaft. Rotation of the collar will move the chain 58 to rotate the countershaft 61 thereby causing the crank pins 67 to move in an orbital path about the axis of the countershaft. This movement of the crank pins 67 will cause equal opposite and reciprocative movement of the cables 72 over the pulleys 71 thereby causing the arm 21 to be swung alternately in opposite directions, between its two extremes of movement, and causing the cutter disk 27 to repeatedly traverse the path of movement of the material 9 thus severing the material.

Means is provided for alternately engaging the clutch sleeve 49 with the hub 52 and with the collar 53 so that the material 9 is moved intermittently by the feed rolls and, between such movements of the material, the cutter disk is moved to cut the material. Mounted on the end of the jack shaft 42 is a sprocket 77 meshing with an upwardly extending endless chain 78 which engages a sprocket 79 carried on the end of a camshaft 81 journaled in pillow blocks 82 mounted on the cross-members 63. The camshaft also carries a disk cam 83 having a radially elevated segment 84 thereon. A cam lever 86 has one end pivotally journaled on a pin 87, carried by clips 88 mounted on one of the cross-members 63, and extends transversely across the other cross-member 63 between a pair of guide clips 89 carried by the latter cross-member. The extreme end of the cam lever is provided with a shoe 91 which rests on the periphery of the cam 83. A connecting rod 92 is pivotally attached at one end to the cam lever 86 and at the other end with one lever 93 of a bell crank pivotally mounted on a pin 94 secured in a cross-member 96 which extends between two of the corner posts 3. The other lever 97 of the bell crank is formed with a yoke 98, which straddles the sleeve 49, and is provided with pins 99 which engage a peripheral groove 101 formed in the sleeve. As the jack shaft 42 is rotated, the chain 78 will drive the

camshaft 81 thereby rotating the cam 83. When the shoe 91 of the cam lever 86 rests on the portion of the cam of least radius the cam lever will be in its lowermost position which will position the bell crank so that the clutch sleeve 49 is at its left-hand extremity of travel engaging the clutch teeth of the hub 52. This, as was explained above, will connect the feed rolls 8 to be driven so that the material 9 will be advanced. As the cam 83 continues to rotate the elevated portion 84 thereof will ride under the shoe 91 thereby causing the cam lever to move upwardly. This movement of the cam lever will impart movement, through the connecting rod 92, to the bell crank to move the clutch sleeve 49 to its right hand extremity of travel so that the sleeve and the collar 53 are interconnected. This movement will disengage the previously connected sleeve and hub 52 so that advance motion of the material 9 is stopped and movement of the arm 21 to pass the cutter disk 27 transversely of the material 9 is started. Continued rotation of the cam will again bring the depressed portion thereof below the shoe 91 whereupon the cam lever will drop by gravity, the sleeve 49 will be shifted to its left hand extremity, and the clutch members will again be connected to effect advance movement of the material 9. The sprocket ratios between the various shafts and the cam are preferably such that the minimum length of material which may be cut from the supply strip thereof is one which extends from the cutter disk 27 to a point between the confronting peripheries of the right-hand pair of feed rolls 8, as viewed in Figure 1, at which there is sufficient tractional engagement between the rolls and the material to insure that the severed pieces of material will be carried off by the feed rolls. The extension of this minimum cut-off length may be accomplished by decreasing the size of the sprocket carried by the feed roll shaft and driven by the chain 56.

Having thus described my invention in detail, what I claim as new and desire to secure by Letters Patent is:

1. A cut-off machine comprising a supporting frame, pairs of rotatable feed rolls carried by said frame and tractionally engaging strips of the material to be cut, an arm mounted for pivotal movement on said frame in a direction transverse with respect to the path of movement of said material, a rotatable cutter journaled on said arm and engageable with and to cut said strips of material during movement of said arm, means mounted on said arm for rotating said cutter, means for intermittently rotating said feed rolls to progressively advance said strips of material, and means for moving said arm between rotations of said feed rolls.

2. A cut-off machine comprising a supporting frame, pairs of rotatable feed rolls carried by said frame and tractionally engaging strips of the material to be cut, an arm mounted for pivotal movement on said frame in a direction transverse with respect to the path of movement of said material, a rotatable cutter journaled on said arm and engageable with and to cut said strips of material during movement of said arm, a motor mounted on said arm, means connecting said cutter to be rotated by said motor, a driven shaft journaled on said frame, drive mechanism for rotating said feed rolls, drive means for moving said arm, and means for alternately connecting said driven shaft with said drive mechanism

for rotating the feed rolls and with said drive means for moving the arm.

3. A cut-off machine comprising a supporting frame, pairs of rotatable feed rolls carried by said frame and tractionally engaging strips of the material to be cut, an arm mounted for pivotal movement on said frame in a direction transverse with respect to the path of movement of the material, a rotatable cutter journaled on said arm and engageable with and to cut said strips of material during movement of said arm, a motor mounted on said arm, a belt connecting said cutter to be rotated by said motor, first and second shafts journaled on said frame, means connecting said first shaft and said feed rolls for rotation together, means connecting said arm to be moved by and upon rotation of said second shaft, a driven rotatable clutch member journaled on said frame, and means for engaging said clutch member, alternately, with and to rotate said first and second shafts.

4. A cut-off machine comprising a supporting frame, pairs of rotatable feed rolls carried by said frame and tractionally engaging strips of the material to be cut, an arm mounted for pivotal movement on said frame in a direction transverse with respect to the path of movement of the material, a rotatable cutter journaled on said arm and engageable with and to cut said strips of material during movement of said arm, a motor mounted on said arm, a belt connecting said cutter to be rotated by said motor, first and second shafts journaled on said frame, sprockets carried, respectively, by said first shaft and a feed roller, an endless chain meshing with the first shaft and feed roll sprockets, radially offset crank pins carried by and movable orbitally about the axis of said second shaft, said crank pins being relatively disposed diametrically opposite with respect to said axis of the second shaft, guide pulleys carried by said frame, cables connected at one end with the respective crank pins, engaging said guide pulleys and secured at their other ends with said arm, a toothed hub secured on and for rotation with said first shaft, a toothed collar journaled on said first shaft in axially spaced relation with respect to said hub, sprockets carried, respectively, by said collar and said second shaft, an endless chain meshing with said sprockets of the collar and the second shaft, a power-driven toothed clutch sleeve axially slidable on said first shaft and positioned between said hub and collar, and powered means for shifting said clutch sleeve to alternately engage said hub and collar.

5. A cut-off machine comprising a supporting frame, pairs of rotatable feed rolls carried by said frame and tractionally engaging strips of the material to be cut, an arm mounted for pivotal movement on said frame in a direction transverse with respect to the path of movement of the material, a rotatable cutter journaled on said arm and engageable with and to cut said strips of material during movement of said arm, a motor mounted on said arm, a belt connecting said cutter to be rotated by said motor, first and second shafts journaled on said frame, sprockets carried, respectively, by said first shaft and a feed roller, an endless chain meshing with the first shaft and feed roll sprockets, radially offset crank pins carried by and movable orbitally about the axis of said second shaft, said crank pins being relatively disposed diametrically opposite with respect to said axis of the second shaft, guide pulleys carried by said frame, cables connected at

one end with the respective crank pins, engaging said guide pulleys and secured at their other ends with said arm, a toothed hub secured on and for rotation with said first shaft, a toothed collar journaled on said first shaft in axially spaced relation with respect to said hub, sprockets carried, respectively, by said collar and said second shaft, an endless chain meshing with said sprockets of the collar and the second shaft, a power-driven toothed clutch sleeve axially slidable on said first shaft and positioned between said hub and collar; a bell-crank pivotally mounted on said frame and having one lever arm thereof engaged with said clutch sleeve, a cam shaft jour-

naled on said frame, means connecting said cam shaft to be rotated synchronously with said first shaft, said cam shaft having a disk cam mounted on and for rotation therewith, a cam lever pivotally mounted at one end on said frame and having the other end thereof engaging the periphery of said cam, and a connecting rod pivotally connected at its respective ends with said cam lever and the other lever arm of said bell crank in such a manner that upon movement of said cam lever by said cam said bell crank will be moved to alternately engage said clutch sleeve with said hub and collar.

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