

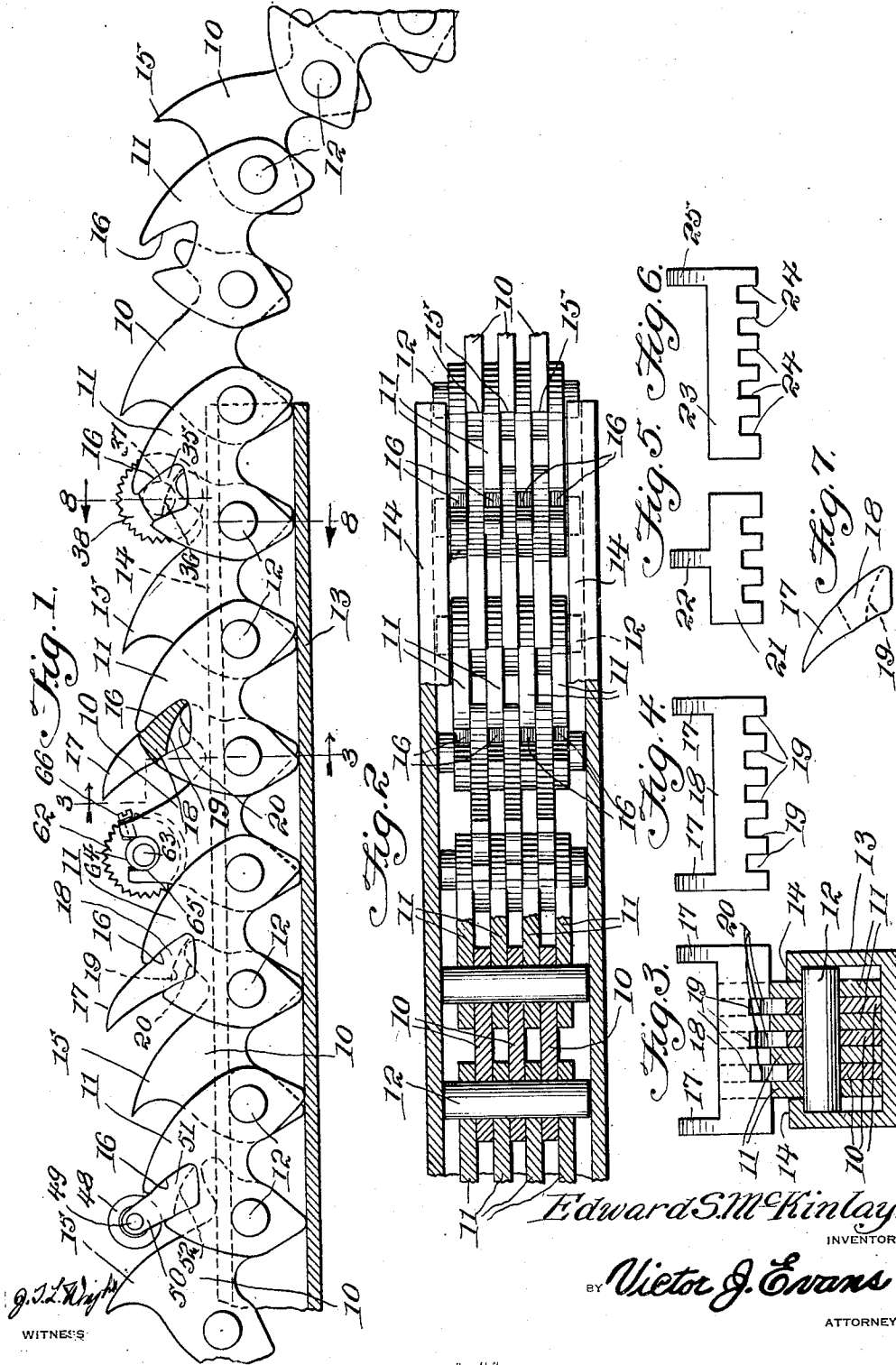
June 24, 1930.

E. S. McKINLAY

1,765,602

CHAIN CUTTER

Original Filed Feb. 11, 1924 3 Sheets-Sheet 1



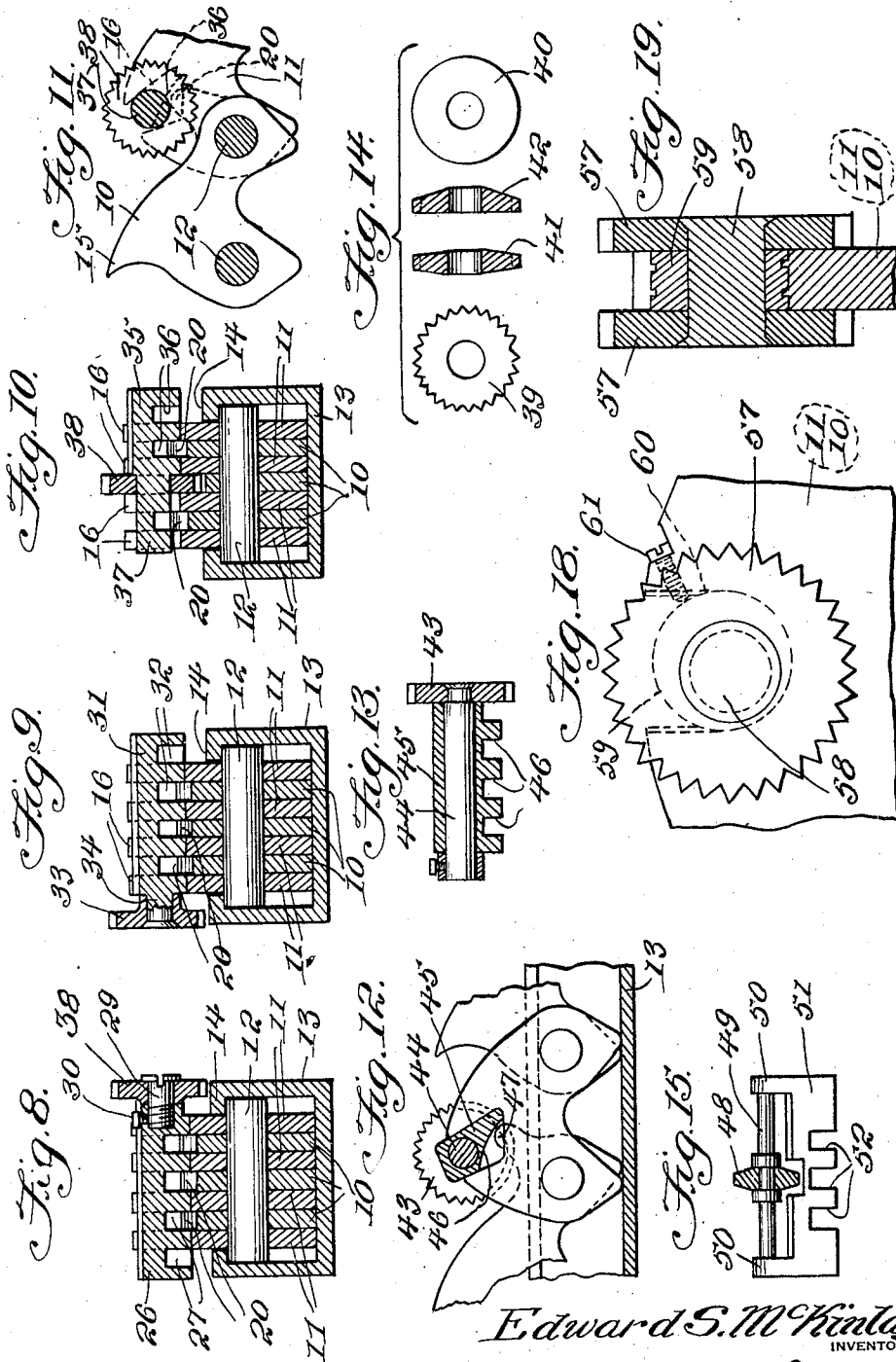
June 24, 1930.

E. S. McKINLAY

1,765,602

CHAIN CUTTER

Original Filed Feb. 11, 1924 3 Sheets-Sheet 2



J. L. Wright
WITNESS:

Edward S. McKinlay
INVENTOR

BY Victor J. Evans
ATTORNEY

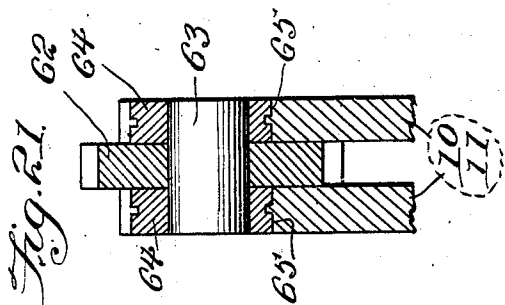
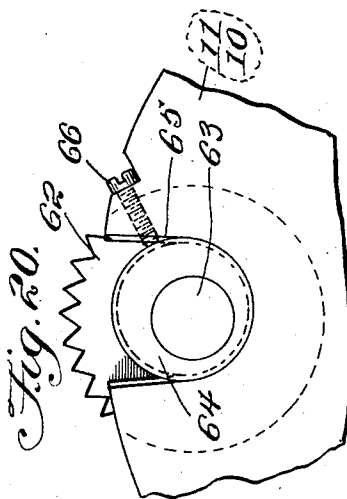
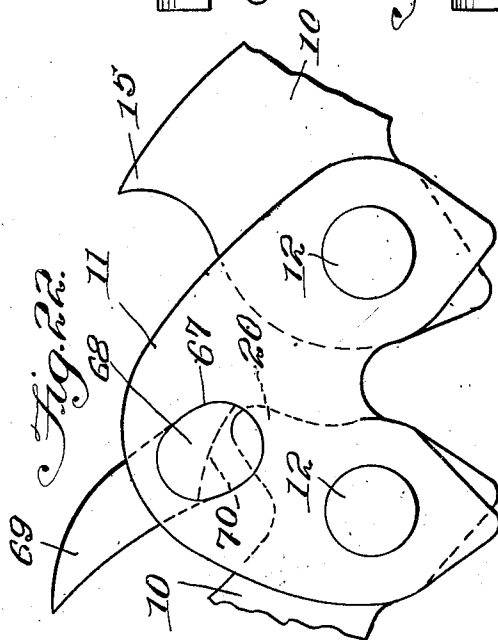
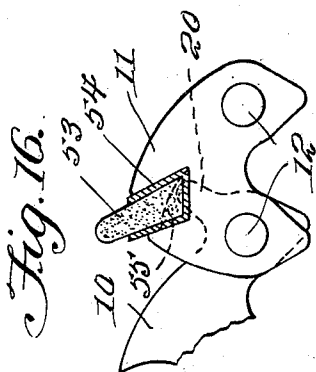
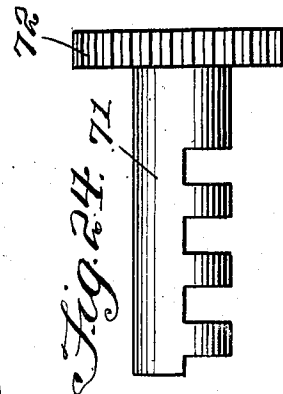
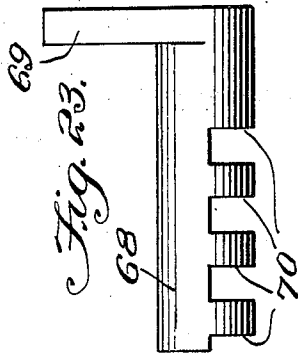
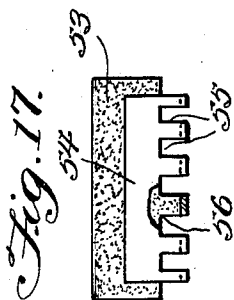
June 24, 1930.

E. S. McKINLAY

1,765,602

CHAIN CUTTER

Original Filed Feb. 11, 1924 3 Sheets-Sheet 3



J. L. Wright

WITNESS:

Edward S. McKinlay
INVENTOR

Victor J. Evans
ATTORNEY

UNITED STATES PATENT OFFICE

EDWARD S. MCKINLAY, OF DENVER, COLORADO

CHAIN CUTTER

Application filed February 11, 1924, Serial No. 692,159. Renewed January 6, 1928.

This invention relates to chain cutters primarily intended for use in connection with coal or ore digging machines, although susceptible for use in other capacities, and has for its chief characteristic the provision of means whereby a variety of cutting and breaking tools can be quickly and conveniently associated with or removed from the links of the chain, and held associated with the latter without the use of separable fastening elements.

In carrying out the invention, it is my purpose to construct certain links of the chain to support the various cutting and breaking tools and their holders and to construct other links of the chain for interlocking association with said holders, to dispense with the use of separable fastening elements for this purpose, and at the same time eliminate all possibility of the tools or the holders becoming casually or accidentally separated from the chain while in use.

Other objects and advantages of the invention will be apparent, when the following detailed description is read in connection with the accompanying drawings, the invention residing in the construction, combination and arrangement of parts as claimed.

In the drawings forming part of this application, like numerals of reference denote similar parts in the several views, and wherein:

Figure 1 is a view partly in section showing a portion of the chain in side elevation.

Figure 2 is a plan view partly in section showing the chain with the cutting and breaking tools removed therefrom.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a view of one of the cutting tools showing a slight modification of the tool illustrated in Figure 3.

Figure 5 is another modified form of cutting tool.

Figure 6 is a still further modified form of cutting tool.

Figure 7 is an end elevation of the various tools above described.

Figure 8 is a sectional view taken on the line 8—8 of Figure 1.

Figure 9 is a view similar to Figure 8 showing the cutting tool on the other end of the holder therefor and associated therewith in a manner different from that shown in Figure 8.

Figure 10 is a view similar to Figure 8 of a modified construction showing the cutting tool arranged centrally of its holder.

Figure 11 is a fragmentary end elevation of Figure 10.

Figure 12 is a view similar to Figure 11 of a modified construction.

Figure 13 is a longitudinal sectional view through the tool holder as shown in Figure 12, showing the tool and its shaft associated therewith.

Figure 14 is a view showing different types of breaking wheels adapted to be used with the chain.

Figure 15 is a view in elevation of one of these breaking wheels mounted on its holder.

Figure 16 is a view showing another modified form of the invention, wherein use is made of an abrasive tool.

Figure 17 is a view in elevation of the tool and its holder shown in Figure 16.

Figure 18 is an end elevation of another modified form of the invention.

Figure 19 is a sectional view taken through Figure 18 and at a right angle thereto.

Figure 20 is a view similar to Figure 18 of another modified construction.

Figure 21 is a sectional view taken through Figure 20 and at a right angle thereto.

Figure 22 is a fragmentary view of the chain in side elevation showing another modification.

Figure 23 is a view of the tool and holder of the type used in Figure 22.

Figure 24 is a view of a modified form of tool and holder adapted to be used in place of the tool illustrated in Figure 23.

Referring to the drawings in detail, and particularly to Figures 1, 2 and 3, it will be noted that the endless chain is made up of a plurality of units, and wherein each unit embodies a series of spaced parallel links

of the type illustrated, and a series of links 11 as shown. All of the links of the respective series are connected by a strong pivot pin 12. The chain in its entirety is adapted to pass through a guide 13, preferably of channel like formation, the upper edges of which terminate to provide inwardly directed flanges 14 which overlie the adjacent ends of the pivot pins 12 as clearly shown in Figure 3, and this construction prevents the chain from moving out of the guide as will be readily understood. It will be noted that the links 11 of each chain unit include one more link than the series of links 10, inasmuch as the links 11 constitute the outermost links and are alternately arranged upon the pivot 12 with the links of the series 10. It might here be stated, that the width of the chain can be varied by the use of more or less links without departing from the spirit of the invention.

In accordance with the present invention, the links 10 of each chain section are formed to provide pointed extensions forming teeth 15, while the links 11 of each section are designed to accommodate cutting and breaking tools, which as shown in Figure 1 extend to a point beyond the teeth 15. The links 11 for the purpose mentioned are formed with substantially dovetailed notches 16 and certain of the cutting and breaking tools are associated with holders of similar cross sectional configuration so as to accommodate themselves within the notches 16 of the links 11. For instance, upon inspection of Figures 3 to 7 inclusive, it will be noted that the cutting tools include one or more teeth 17 which are associated with what I term a holder 18, the latter being preferably integrally connected with the teeth 17. By reason of this construction, the holder is slipped in the notches 16 from one side of the chain, and cannot be casually separated therefrom while the chain is in use. Each holder 18 is formed on its underside with a plurality of notches 19, and these notches are adapted to receive the lugs 20 carried by the links 10 at a point adjacent their pivot, the lugs preventing endwise movement of the tool and their holders as will be readily understood. This association of parts is clearly illustrated in Figure 3, wherein it will be noted that the tool holder 18 is formed with three notches 19 to accommodate a similar number of lugs projecting from the links 10, while projecting from the opposed ends of the holder 18 are teeth 17. In Figure 4, the same character of tool is illustrated, except that the holder 18 is provided with more notches 19 than there are lugs 20, so that the tool and its holder can be adjusted transversely of the chain, and by adjusting every other tool in opposite directions, the working area of the chain can be increased. The tool shown in Figure 5

is of the same general construction as that shown in Figure 3 including a holder 21 and a single tooth 22 which projects centrally from the holder. The tool in Figure 6 also includes a holder 23 provided with a large number of notches 24, and with a single tooth 25 arranged at one end of the holder as shown. However, any of these tools can be quickly and conveniently associated with the chain sections or removed therefrom when desired. When in position for use, the lugs 20 are received by the notches formed in the tool holders, which fact coupled with the cross sectional configuration of said holders and the notches 16 of the links 11 prohibit the tools from becoming loose or casually separated from the chain under any circumstances. The tools however, can be easily removed from the chain by simply moving the links 10 upon their pivots in a direction to move the lugs 20 out of the notches of the particular tool holder to be removed, after which the tool holder can be slid transversely of the chain out of the notches 16. In Figure 1, I have shown one of the links 10 so adjusted in order to move the lugs 20 out of the notches of the tool holder for this purpose. Upon inspection of Figure 1 it will be noted that certain units of the chain are equipped with cutting wheels or disks 38, which may be used in combination with or independently of the tools above mentioned, or the wedging or breaking tools to be hereinafter described. However, wherever a wheel or disk of this character is used, it is always supported by links 11 of the particular unit of the chain, but which are associated therewith in a manner slightly different than the teeth above referred to.

In this connection, it will be noted upon inspection of Figures 8 to 11 inclusive, that each cutting disk or wheel 38 is mounted upon a holder formed with grooves to receive the lugs 20 carried by the links 10. In Figure 8, this holder is indicated at 26 while the notches for the reception of the lugs 20 are indicated at 27. The cutting disk or wheel 38 is arranged at one end of the holder and held associated therewith by means of a short bolt 29, which in turn is held connected with the holder by means of a locking pin 30. In Figure 9, the holder is indicated at 31 and formed with the usual notches 32 for the reception of lugs 20, but in this particular instance, the cutting wheel or disk 33 is arranged on the opposite end of the holder from that shown in Figure 8, and secured thereto in a slightly different manner. The holder in this instance is formed with a reduced extension 34 which is received by the hub of the cutting disk or wheel, and the end of the extension is subsequently spread as shown to hold the wheel or disk thereon. In Figure 10, the

holder is indicated at 35 and has its notches indicated at 36. This holder is also formed with reduced extremity 37 received by the opening in the cutting disk or wheel 38, and it will be noted that in this particular form of the invention, the wheel is arranged centrally of the holder in contra-distinction to being arranged on either end thereof as shown in Figures 8 and 9. It will also be observed that in each of these instances the tool holder is formed with a greater number of notches than there are links 10, so that the said holders together with their tools can be adjusted transversely of the chain to vary its locking area or width. Then again, the disks or wheels carried by these tool holders can vary in shape and construction, that is to say that any one or more of the wheels or disks shown in Figure 14 can be used. In this figure, it will be noted that the wheel or disk 39 is serrated, while the tool 40 is smooth on both sides. Then again, the tool indicated at 41 is tapered on both sides, while the tool indicated at 42 is tapered only on one side. As above stated, when the tapered tools are used, they tend to spread the grooves which they enter, and incidently break up the coal or ore of which the wall is composed. These tapered or wedged shaped disks may also be provided with a toothed periphery as shown in Figure 14, so that they may be used with both a cutting and breaking action.

In Figures 12 and 13, I have illustrated another modified construction, wherein the cutting disk or wheel 43 is carried by one end of a shaft 44 which passes through a bearing 45. This bearing is of cross sectional configuration to accommodate itself to the notches formed in the links 11 which receive the bearing which is also provided with notches 46 to receive the lugs 47 of the links 10 as shown in Figure 12.

In Figure 15, I have illustrated another method of mounting one of the tapered wheels or disks upon the links of a particular unit of chain, and it will be noted that the wheel or disk 48 is arranged centrally of the shaft 49 mounted between the parallel extensions 50 projecting from the opposed ends of the tool holder 51. This holder is also of the cross sectional contour to accommodate itself to the dovetail notches in the links 11 and formed with notches 52 to receive the lugs carried by the links 10.

In Figures 16 and 17, I have illustrated a means for supporting an abrasive tool 53, which tool is received by a channel like holder 54 which is also substantially dovetailed in cross section to slip endwise in the notches formed in the links 11. The bottom of this holder as well as the lower edge of the tool itself is formed with notches 55 and

56 respectively to receive the lugs 20 carried by the links 10. By reason of this construction, it is manifest that the abrasive tools can be adjusted transversely across the chain and arranged to receive the lugs 20 of the links 10 without disturbing the holder 54.

In Figures 18 and 19, I have shown a means for supporting the cutting disks or wheels in pairs, these tools being indicated at 57 and mounted on a short shaft 58. The shaft is received by a bearing 59 and the latter positioned in a notch 60, of the links 11. It will be noted upon inspection of Figure 18 that this notch is substantially U-shaped to accommodate the bearing 59 which is held in position upon the links 11 by means of a radially disposed locking bolt 61.

The construction illustrated in Figures 20 and 21 differs from the construction just described in that a single cutting wheel or disk 62 is used and arranged centrally on the shaft 63. This shaft is of course arranged in a bearing 69 received by a substantially U-shaped notch 65 in the links 11 and held positioned therein by means of a locking bolt 66.

In Figures 22 and 23, it will be noted that the links 11 instead of being formed with notches to accommodate a tool holder are provided with oval shaped openings 67 which receive the tool holder 68 of similar cross sectional configuration. The tool associated with this holder is preferably in the form of a tooth indicated at 69 and carried at one end of the holder so that the latter can be conveniently associated with or removed from the links when desired. The holder 68 is also formed with notches 70 which are arranged to receive the lugs 20 carried by the links 10. In Figure 24, I have illustrated a tool holder 71 of the same cross sectional configuration as the tool holder 68 just described, in that the tool holder 71 is also adapted to be received by the oval shaped openings 67 formed in the links 11. However, the tool holder 71 supports a wheel or disk 72 at one end thereof and can be used in place of the tool 69 carried by the tool holder 68. Manifestly, I have provided a cutting chain which can be equipped with various forms of tools to effectively cut and break down masses of coal, ore or the like, and I have provided means whereby these tools can be used in any combination desired, and the tools quickly and conveniently associated with or removed from the chain for this purpose.

In practice, the cutting disks or wheels which are mounted for rotation are used to cut kerfs in the work, and the wedging or breaking tools are arranged to enter these kerfs and break the material between the grooves or kerfs defined by the cutting

disks. While the links of each chain unit 10 have been defined as being formed to provide teeth 15, it is to be understood that these teeth are not used for any action, unless the cutting disks or wedging and breaking tools become injured or otherwise impaired while the chain is in operation. While different units of the chain may be equipped with different characters of cutting tools and wedging and breaking tools, it is my purpose to use the cutting disks independently of any other type of tool as well as in combination with the wedging and breaking tools and mount these cutting disks so that they can be effectively locked on the particular unit with which they are associated, and at the same time easily separated therefrom when desired. Then again, any number of disks may be used, to make up any particular unit. Furthermore, when cutting disks of the character shown in Figure 14 are used, wherein it will be noted that the disks are wedge shaped on one or both sides, the use of the wedge shaped element 48 shown in Figure 15 can be dispensed with inasmuch as the cutting element is designed to be used with both a cutting and breaking action.

While it is believed that from the foregoing description, the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described, and that such changes may be resorted to when desired as fall within the scope of what is claimed.

Having thus described the invention, I claim:

1. In a chain cutter of the character described, a plurality of chain units pivotally connected together, each unit including a series of spaced links, tools adapted to be supported by the links of certain units, and designed to kerf the work, and subsequently break it down between the kerfs with a wedging rotary action, and means carried by the links of the adjacent unit for interlocking engagement with said tools to hold the latter in position for use.

2. In a chain cutter of the character described, a plurality of chain units pivotally connected together, the links of certain units being notched, cutting tools adapted to be received by said notches and supported by said links, and means carried by the links of the adjacent unit for interlocking engagement with said tools and holding the latter associated with their respective links of the first mentioned unit.

3. In a chain cutter of the character described, a plurality of chain units pivotally connected together, each unit including a series of spaced links, tools adapted to be supported by links of certain units and designed to kerf the work, and additional tools

rotatably mounted upon the links of the other units and designed to break down the work between the kerfs with a rotary wedging action within said kerfs.

4. In a chain cutter of the character described, the combination with the chain units, each including spaced series of links pivotally connected together, of a tooth projecting from each link of every alternate unit, a cutting tool, for every other unit, a holder for each tool, and means whereby said holder is detachably mounted upon the links of its particular unit and capable of adjustment transversely of the chain for the purpose specified.

5. In a chain cutter of the character described, the combination with the chain units, each including spaced series of links pivotally connected together, a cutting tool detachably mounted on certain of said units, and means whereby said tools are held in position by the links of the adjacent unit.

6. In a chain cutter of the character described, the combination with the chain units, each including spaced series of links pivotally connected together, of a tooth projecting from each link of every alternate unit, a cutting tool, for the other units, a holder for each tool, said holder being detachably mounted on the links of the last mentioned unit and provided with spaced notches, and means carried by the links of the first mentioned units and adapted to be received by said notches for interlocking association with said holder.

7. In a chain cutter of the character described, the combination with the chain units, each including spaced series of links, pivotally connected together, of a tooth projecting from each link of one series, a cutting tool including a holder detachably mounted on the links of the other series, and having a plurality of notches, and lugs projecting from the links of the first mentioned series and adapted to be received by said notches for interlocking association with the holder, and said holder being provided with a greater number of notches than said lugs, whereby said holder is susceptible of adjustment transversely of the chain for the purpose specified.

8. In a chain cutter, chain units, each including spaced series of links pivotally connected together, a tooth projecting from each link of one series, the links of the other series having openings, cutting tools including holders designed to be received by said openings and detachably mounted on said links, said holders having a plurality of notches, and lugs projecting from the links of the first mentioned series and adapted to be received by said notches for interlocking association with said holder.

9. In a chain cutter, of the character described, chain units each including spaced

series of links pivotally connected together, a tooth projecting from each link of one series, the links of the other series having openings, a cutting tool including a holder adapted to be slid endwise into said openings, said openings and holder being of a cross sectional configuration to prevent the holder from moving out of said links, said holder having a plurality of spaced notches, and lugs projecting from the links of the first mentioned series and adapted to be received by the notches of said holder for the purpose specified.

sidewise extending dovetailed seats the bottoms of which are parallel with the plane in which the axes of the links are located, and cutting elements removably fitting in said seats and insertible thereinto from the side of the chain, and means for holding said cutting elements from sidewise movement in their dovetailed seats.

In testimony whereof I affix my signature.

-- EDWARD S. McKINLAY.

10. In a chain cutter for mining machines, the combination with the chain units, of cutting tools detachably mounted on certain of said units, and means whereby each of said tools is held in position by the adjacent link unit.

11. In a chain cutter for mining machines, the combination with the chain units pivotally connected together, of a guide plate for housing said units, cutting tools detachably mounted on certain of said units, means whereby each of said tools is held in position by the adjacent link unit, and means on said guide plate for engaging the pivots of said units to prevent transverse displacement of said chain.

12. In a chain cutter of the character described, the combination with the chain units, each including spaced series of links pivotally connected together, a guide plate for housing said units, cutting and wedging tools detachably mounted on certain of said units, means whereby each of said tools is held in position by the adjacent link unit, and retaining flanges on said guide plate adapted to engage the pivots of said units to prevent transverse displacement of said chain.

13. The combination of links connected with each other on pivotal axes and having sidewise extending seats wherein to removably hold cutting elements, and said cutting elements being adjustable in and along said seats sidewise toward either side of the chain in a direction parallel with the said axes of the links, for varying the cutting area of the chain, and means for holding said elements from sidewise movement in their seats.

14. The combination of links connected with each other on pivotal axes and having sidewise extending dovetailed seats parallel with the axes of the links wherein to removably hold cutting elements, and said cutting elements being adjustable in and along said seats sidewise toward either side of the chain in a direction perpendicular to the plane in which the cutting elements travel, for varying the cutting area of the chain, and means for holding said elements from sidewise movement in their dovetailed seats.

15. The combination of chain links having

80

85

90

95

100

105

110

115

120

125

130