(No Model.) 2 Sheets—Sheet 1.

C. O. PALMER.

CUTTER BIT FASTENING FOR MINING MACHINES.

No. 594,896. Patented Dec. 7, 1897.

Fig. 1

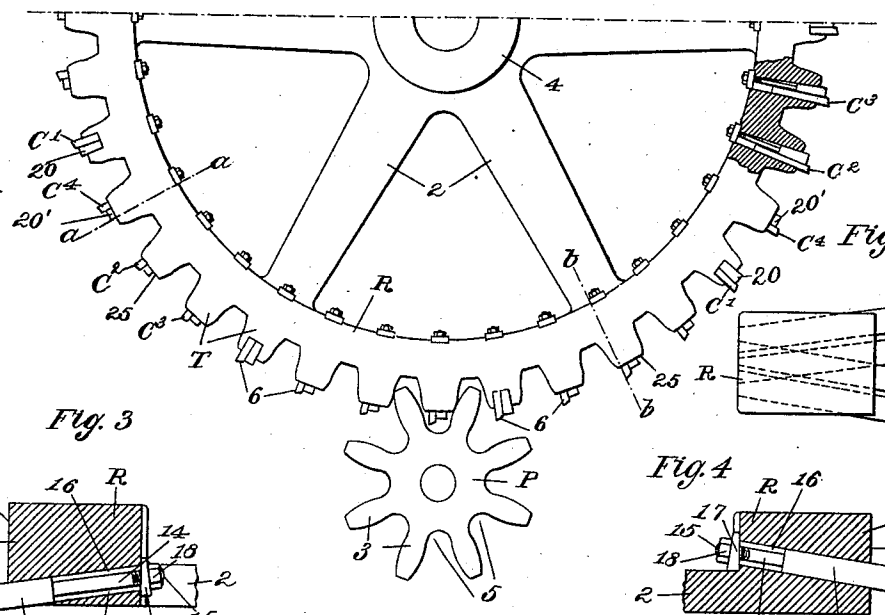


Fig. 5

Fig. 3

Fig. 4

Fig. 2

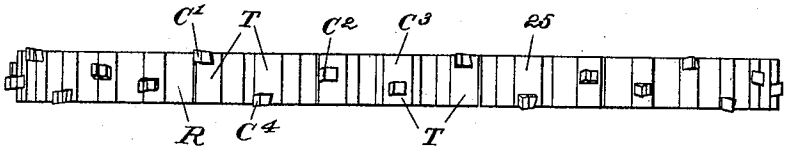


Fig. 11

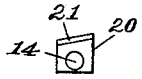


Fig. 9

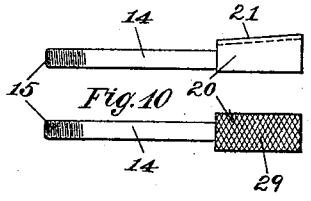


Fig. 10

Fig. 8



Fig. 6

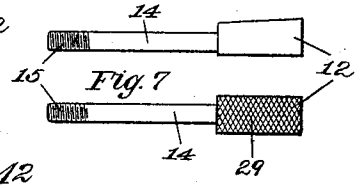


Fig. 7

Fig. 12

Fig. 14

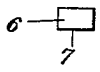
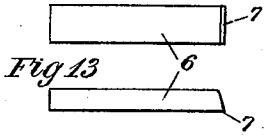


Fig. 13



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 15

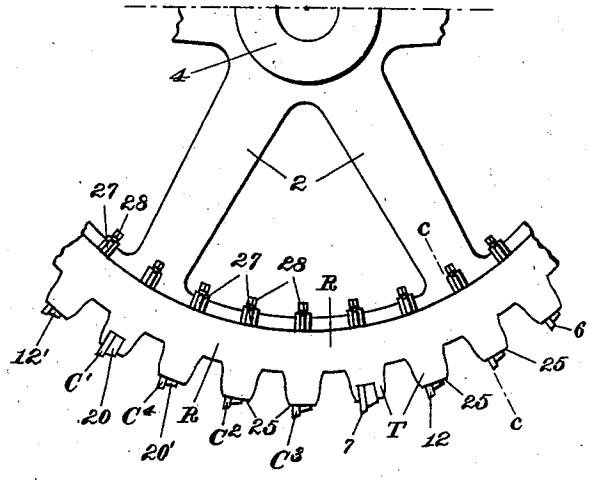


Fig. 16

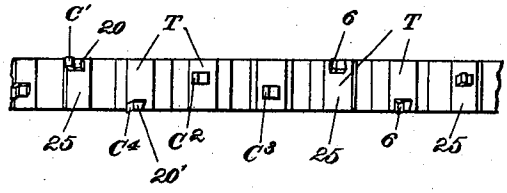


Fig. 17

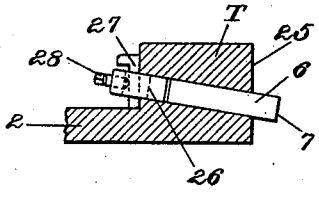


Fig. 18

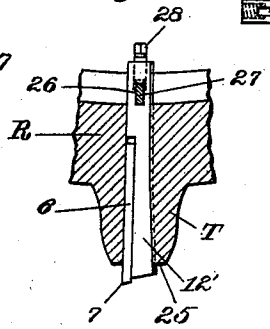


Fig. 19

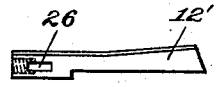


Fig. 20



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UNITED STATES PATENT OFFICE.

CHARLES O. PALMER, OF CLEVELAND, OHIO.

CUTTER-BIT FASTENING FOR MINING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 594,896, dated December 7, 1897.

Application filed September 14, 1891. Serial No. 405,577. (No model.)

To all whom it may concern:

Be it known that I, CHARLES O. PALMER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Cutter-Bit Fastenings for Mining-Machines, of which the following is a specification.

This invention relates to cutter-bit fastenings for mining-machines, the object being to provide an improved cutter-bit fastening specially adapted to the class of mining-machines described in my Patent No. 472,177, dated April 5, 1892.

In the drawings forming part of this specification, Figure 1 is a plan, partially in section, of half of a cutter-wheel equipped with my present improvements. Fig. 2 is a side elevation of the cutter-wheel of Fig. 1. Fig. 3 is a section of the wheel-rim in line *a a* of Fig. 1. Fig. 4 is a section of the wheel-rim in line *b b* of Fig. 1. Fig. 5 is a diagrammatic view illustrating the relative positions in the wheel-rim of a single set of cutter-bits. Fig. 6 is a detailed top view of a cutter-wedge. Fig. 7 is a side view of the wedge of Fig. 6. Fig. 8 is an end view of the wedge of Fig. 6. Fig. 9 is a detailed side view of an outside cutter-wedge. Fig. 10 is a side view of the wedge of Fig. 9. Fig. 11 is an end view of the wedge of Fig. 9. Fig. 12 is a side view of the cutter-bit. Fig. 13 is a top view of the cutter-bit of Fig. 12. Fig. 14 is an end view of the cutter-bit of Fig. 12. Fig. 15 is a plan, partially in section, of an alternative form of cutter-fastening. Fig. 16 is a side view of the cutter-wheel of Fig. 15. Fig. 17 is a section of the wheel-rim in line *c c* of Fig. 15. Fig. 18 is a horizontal section of part of the cutter-wheel of Fig. 15, showing the cutter and wedge in position. Fig. 19 is a detailed top view of a cutter-wedge of Fig. 15. Fig. 20 is an end view of Fig. 19.

Similar characters designate similar parts in all the figures.

The wheel for carrying the several removable cutter-bits consists of a rim R, which may be carried by a series of arms 2, reaching out from the cutter-wheel hub 4. The cutter-rim R is provided on its periphery with the cogs or gear-teeth T, whereby the wheel is actuated from the pinion P, whose teeth 3 mesh with the said cutter-wheel teeth. A suitable number of removably-fixed cutter-bits are carried by the cutter-wheel, these cutter-bits being set at varying heights on the periphery of the wheel and adjustably secured in place by clamping devices. The cutter-bits are carried in mortises formed in planes substantially radial of the cutter-wheel axis and project outwardly through the aforesaid cogs T, as will be understood from Figs. 1 to 4.

The cutter-driving pinion P has the spaces 5 between the teeth 3 thereof cut away or deepened, as illustrated in Fig. 1, to provide for the passage of the projecting cutter-bits.

As shown in the drawings, the cutter-bits are arranged in sets—in the present instance of four each—the respective cutter-bits of each set being designated in a general way by C′, C^2, C^3, and C^4, respectively.

One arrangement of the cutter-bits relatively to the plane of revolution of the cutter-wheel is illustrated in Figs. 3, 4, and 5. The outside cutter-bits C′ and C^4 are set at opposite inclinations, as illustrated in Figs. 3 and 5, the points of the cutter-bits extending beyond the sides of the rim, so as to cover a greater width than the thickness of the rim, and thus cut a kerf or channel in which the rim may play freely. As a matter of convenience the intermediate cutter-bits C^2 and C^3 may be set at inclinations corresponding, respectively, to the cutter-bits C′ and C^4, as illustrated in Fig. 5.

The cutter-bit fastening consists of the chisel 6, having a suitably-shaped cutting edge 7, and the following-described means for locking or keying the cutter in place; the cutter projecting a suitable distance beyond the cutter-wheel. The wedge for clamping the intermediate cutter-bits C^2 and C^3 is shown in detail in Figs. 6, 7, and 8. It consists of the wedge 12, having the bolt 14, suitably threaded at its projecting end 15. The arrangement of the cutter-bit and its retaining-wedge in the wheel-rim is illustrated in Figs. 3 and 4 and in the sectional portion of Fig. 1. The two parts being slipped into one of the mortises 16 of the wheel-rim, with the cutter-bit projecting a suitable distance, the washer 17 is put over the bolt on the inside

of the rim and the nut 18 screwed onto the bolt to draw the wedge firmly to place, thereby rigidly clamping the cutter-bit in its working position. When the cutter-bit is thus clamped in its working position, the pressure upon the cutting end thereof when cutting acts through the frictional contact between the cutter-bit and wedge to drive the wedge, together with the cutter-bit, farther into the mortise, thereby more tightly clamping the cutter-bit and resisting any further inward movement, so that the operating pressure which tends to push the cutter-bit inward also helps to retain the cutter-bit in position, and for this reason this fastening is called "self-tightening." For removing the cutter-bit the operator has only to slacken the nut, when the wedge may be slid outward, thus releasing the cutter-bit.

The outside cutter-wedge 20 (shown in detail in Figs. 9, 10, and 11) is similar to the wedge shown in Figs. 6, 7, and 8, with the exception that the inclined side thereof 21 is beveled in two directions, being tapered longitudinally, the same as the aforesaid wedge 12, and also beveled sidewise, as shown in Figs. 2 and 11. The mortise for the outside cutter-bit is correspondingly beveled, being "undercut" to receive the beveled wedge 20. As shown at C', Fig. 1, the cutter-bit and its wedge extend through the side of the wheel rim or cog T and are consequently unsupported on the outer side thereof at the point of said cog. The wedge being beveled or dovetailed, as set forth, is thereby prevented from being forced outward by the resistance of the mineral being operated upon and tends to the extent of its adhesion to the cutter-bit to likewise hold this in place. The opposite outside cutter-bit C^4 is similarly held in place by a corresponding wedge 20', which is beveled in the opposite direction, the outside wedges 20 and 20' being alike, excepting that they are formed right-handed and left-handed, respectively.

Figs. 15 to 20, inclusive, illustrate an alternative construction from that shown in the preceding figures for tightening the cutter-wedges. As here shown, the cutter-wedge 12' extends through the wheel-rim and has a transverse mortise 26 passing therethrough. The inner end of the wedge is longitudinally tapped to receive the set-screw 28, whose point bears against the key 27, situated in the said mortise 26, and forces it against the inside of the wheel-rim, as shown in Figs. 17 and 18. By tightening the set-screw 28 against the key 27 the wedge is drawn inward, clamping the cutter-bit 6 firmly in place.

For the purpose of increasing the rigidity with which the cutter-bit may be clamped in its working position the cutter-engaging faces of the said wedges 12, 12', and 20 may be "file-cut" or roughened, as indicated by the cross-hatching at 29, Figs. 7 and 10.

For use in the class of mining-machines hereinbefore specified it is deemed necessary to have within the cutter-wheel rim and between the planes of the sides thereof a space for the arm which carries the cutter-wheel. Accordingly my improved cutter-wheel is shown provided with the arms 2 each of lesser depth than the thickness of the rim R, as will be understood from Figs. 3 and 4. Also it is important in order to secure efficiency with economy of power to use relatively narrow-faced cutter-bits. These requirements are met in my improvements by arranging the cutter-bits in series, as before described, each cutter-bit being relatively narrow, so as to remove the mineral with the least resistance.

As the cutter-bit becomes shortened by repeated sharpening it is inserted less and less deeply into the mortise, the cutting edge projecting the same distance beyond the cogs.

I have not in this application broadly claimed the cutter-fastening herein shown and described, as it forms part of my copending application, Serial No. 593,359, filed May 27, 1896, for a cutter-chain for mining-machines.

Having thus described my invention, I claim—

1. A spur-cog cutter-wheel the cogs of which have radially-disposed inwardly-tapering mortises formed therethrough, cutter-bits seated in said mortises, inwardly-tapered cutter-wedges fitting inwardly from the peripheral openings of said mortises and adapted to be tightened in their seats by the inward pressure upon the cutter-bits in cutting, and having screw-threaded shanks engaging said wedges from the inner side of the rim for drawing the wedges radially inward into close engagement with the cutter-bit.

2. A spur-cog cutter-wheel the teeth of which have radially-disposed inwardly-tapering mortises formed therethrough, cutter-bits seated in said mortises, inwardly-tapered cutter-wedges fitting inwardly from the peripheral openings of said mortises and adapted to be tightened in their seats by the inward pressure upon the cutter-bit in cutting, said cutter bits or wedges being file-cut or roughened, and screw-threaded shanks engaging said wedges from the inner side of the rim for drawing the wedges radially inward into close engagement with the cutter-bit.

3. A spur-cog cutter-wheel the teeth of which have radially-disposed inwardly-tapering undercut mortises formed therethrough, on opposite sides thereof, of cutter-bits seated in said mortises, inwardly-tapered dovetailed cutter-wedges fitting inwardly from the peripheral openings of said mortises, and adapted to be tightened in their seats by the inward pressure upon the cutter-bits in cutting, and having screw-threaded parts engaging said wedges from the inner side of the rim for drawing the wedges radially inward into close engagement with the cutter-bit.

4. A spur-cog cutter-wheel the teeth of which have radially-disposed inwardly-tapering undercut mortises formed therethrough

on opposite sides thereof, of cutter-bits seated in said mortises, inwardly-tapered dovetailed cutter-wedges fitting inwardly from the peripheral openings of said mortises, and adapted to be tightened in their seats by the inward pressure upon the cutter-bits in cutting, and having screw-threaded shanks engaging said wedges from the inner side of the rim for drawing the wedges radially inward into close engagement with the cutter-bit.

CHARLES O. PALMER.

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