July 8, 1941. A. C. CATLAND 2,248,340

ROCK BIT

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Fig. 1.

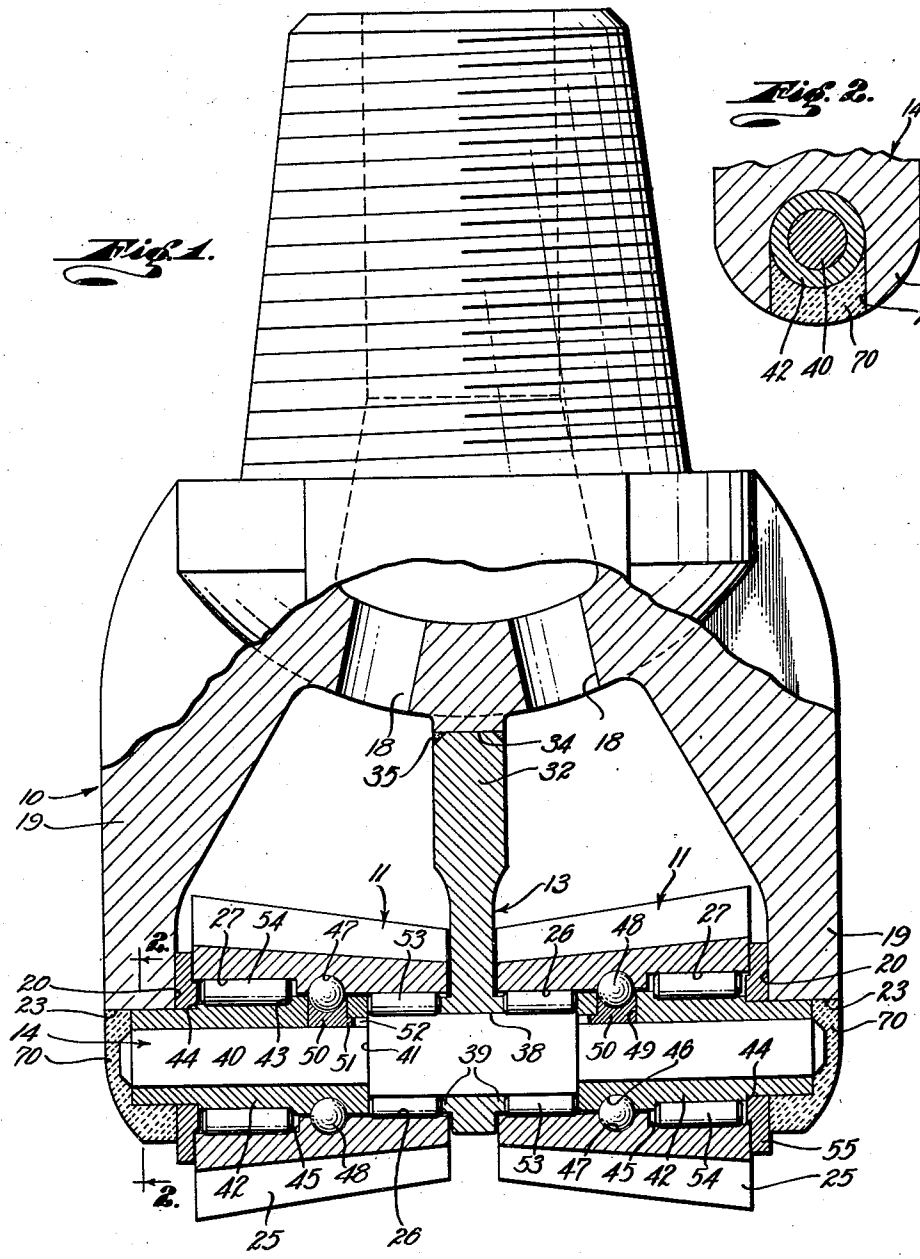


Fig. 2.

Inventor
ALFRED C. CATLAND
By
His Attorney

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Fig. 3.

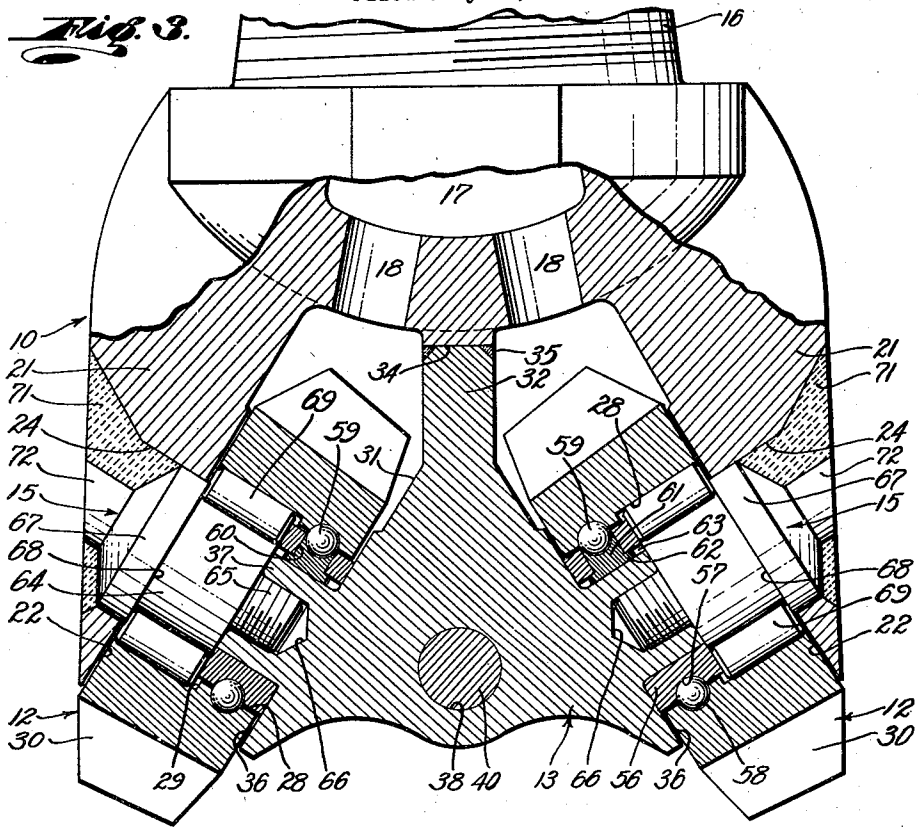
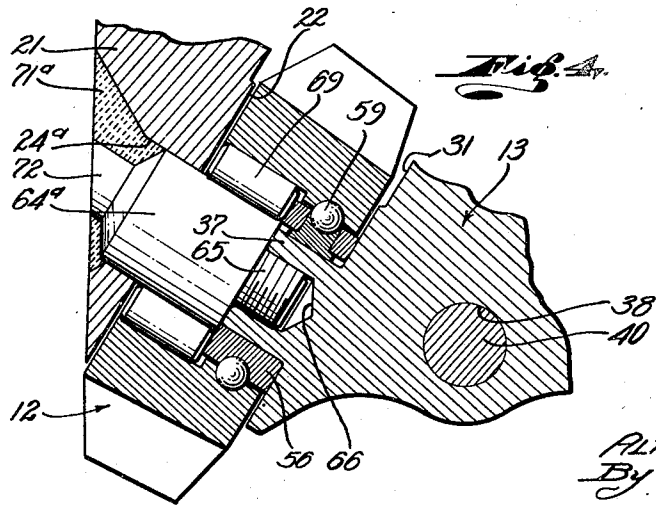


Fig. 4.



Inventor
ALFRED C. CATLAND
By
His Attorney

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UNITED STATES PATENT OFFICE

2,248,340

ROCK BIT

Alfred C. Catland, Alhambra, Calif., assignor to Globe Oil Tools Company, Los Nietos, Calif., a corporation of California

Application July 26, 1940, Serial No. 347,704

14 Claims. (Cl. 255—71)

This invention relates to well drilling tools and relates more particularly to bits for use in the rotary method of well drilling. A general object of the invention is to provide a rotary rock bit of improved construction that is easy to assemble, that is dependable in operation and that is long wearing.

Another object of this invention is to provide a rock bit that is simple and inexpensive to manufacture, requiring a minimum of machining and involving a minimum waste of materials.

Another object of this invention is to provide a rock bit embodying novel means for rotatably mounting the outer cutters in which the customary bushings are eliminated permitting the use of large diametered supporting pins having larger cross sections to resist shearing forces, presenting large wear taking surfaces and forming stronger ties between the body legs of the supporting web structure.

Another object of this invention is to provide a rock bit including improved means for mounting the inner roller cutters that allows the use of cutters of heavier wall thickness or cross section so that long wearing, deep cutting teeth may be formed in the cutters that adapt the bit for use in sticky shales and soft earth formations that quickly pack onto and mud up the shallow cutting teeth of typical cutters.

Another object of this invention is to provide a rock bit embodying a novel assembly, comprising the several cutters and the cutter support, that is easily and quickly arranged on the bit body to directly bear on the same and that is integrally joined with the bit body by easily formed and readily accessible welds.

Another object of this invention is to provide a rock bit of the character referred to in which the inner and outer cutters are supported by anti-friction bearing means which support them against both radial and axial thrusts, said bearing means being sturdy, long wearing and require a minimum of expensive machine work.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of my invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of the improved rock bit of the present invention with the main lower portion of the bit broken away to illustrate the inner cutters and inner cutter mounting means in vertical cross section. Fig. 2 is a fragmentary vertical detailed sectional view taken as indicated by line 2—2 on Fig. 1. Fig. 3 is a fragmentary vertical detailed sectional view of the lower portion of the bit taken in a plane at right angles to the plane of sectioning of Fig. 1, illustrating the outer cutters and the outer cutter mounting means, and Fig. 4 is a fragmentary vertical detailed sectional view showing an alternative means for mounting the outer cutters.

The improved rotary rock bit of the present invention may be said to comprise, generally, a body 10, inner and outer cutters 11 and 12, a supporting member 13, means 14 for rotatably mounting the inner cutters 11 and means 15 for rotatably mounting the outer cutters 12.

The bit body 10 is adapted for attachment to the lower end of a rotary well drilling string and serves to carry the various other parts of the tool. The bit body 10 is provided with means for facilitating its attachment to the drilling string. In practice this may be a tapered screw threaded pin 16 projecting from the upper end of the body 10. A central vertical fluid passage 17 enters the body 10 from the upper end of its pin 16 and spaced discharge ports 18 lead from the lower end of the passage 17 to the under side of the body. A pair of diametrically opposite legs 19 projects downwardly from the lower end of the body 10. The upper parts of the legs 19 slope or curve outwardly and downwardly while the lower parts of the legs are substantially vertical. Flat vertical faces 20 are formed on the inner sides of the straight, vertical lower parts of the legs 19. A second set or pair of legs 21 projects from the lower end of the body 10. The legs 21 are spaced between the legs 19, there being substantially 90° between the vertical centers of the adjacent legs 19 and 21. The legs 21 project downwardly and outwardly from the body 10 having downwardly and outwardly sloping inner sides. Flat finished faces 22 are formed on the sloping inner sides of the legs 21. Slots or notches 23 extend upwardly in the legs 19 from the lower ends of the legs and lateral or radial openings 24 are provided in the legs 21. The longitudinal axes of the openings 24 slope downwardly and inwardly, being substantially normal to the faces 22 and the outer parts of the openings 24 are flared.

The cutters 11 are the inner cutters of the bit operating to cut away the earth formation in the inner part of the well bore. There are two like or similar inner cutters 11. As illustrated in Fig. 1 the cutters 11 are elongate frusto-conical members provided at their peripheries with suitable cutting teeth 25. The opposite ends of

the cutters 11 are flat and normal to the cutters' long axes and central longitudinal openings 26 extend through the cutters from one end to the other. The openings 26 are enlarged in diameter in the outer parts of the cutters, there being cylindrical recesses or sockets 27 leading into the cutters from their outer ends. While the openings 26 are of substantial diameter the cutters 11 are formed to have heavy or thick walls particularly at their inner parts. This allows the formation of deep cutting teeth 25 which are particularly adapted for use in sticky shale and relatively soft earth formations. The tapered or frusto-conical cutters 11 are arranged with their small ends facing inwardly adjacent the central vertical axis of the tool.

The outer cutters 12 are provided to form the outer portion of the well bore and to cut the bore to size or gauge. There are two cutters 12 of substantial diameter. The cutters 12 are alike and are preferably frusto-conical, having slightly pitched peripheries. The ends of the cutters 12 may be flat and parallel and central longitudinal openings 28 of substantial diameter extend through the cutters from one end to the other. The cutter openings 28 have outer parts of increased diameter providing outwardly facing annular shoulders 29 on the interiors of the cutters. The enlarged portions of the openings 28 are of considerable depth or length. Suitable cutting teeth 30 are formed on the peripheries of the outer cutters 12. The corners of the cutting teeth 30 are preferably bevelled off.

The member 13 is a central support or web element arranged at the lower end of the body 10 within the series of legs 19 and 21. The cutter supporting member 13 is a separately formed element that serves to mount or support the several cutter mounting means 14 and 15. The central major portion of the member 13 is vertically disposed in the central vertical plane of the body 10 and is generally triangular in side elevation with broad sides opposing or facing the legs 19 and downwardly and outwardly sloping edges 31 facing the inner sides of the legs 21. A stem 32 extends upwardly from the member 13 and has a flat upper face for bearing on a substantially horizonal surface 34 on the lower end of the body 10. A weld 35 integrally joins the stem 32 with the body 10. The sloping edges 31 of the web 13 have raised finished faces 36 opposing and parallel with the finished faces 22 of the legs 21. Integral lugs or extensions 37 protrude from the faces 36. The extensions 37 are cylindrical and project upwardly and outwardly being substantially concentric with the pitched openings 24 in the legs 21. A horizontal opening 38 is provided in the lower portion of the member 13. The longitudinal axis of the opening 38 lies in a central vertical plane of the body 10 and is coincident with the common longitudinal axes of the notches 23. Raised parts or bosses 39 are provided on the opposite sides of the member 13 in surrounding relation to the opening 38.

The means for rotatably mounting the inner cutters 11 supports the cutters 11 on the member 13 and the body legs 19 for free independent rotation about a horizontal axis. The cutters 11 are arranged between the legs 19 and the member 13 in aligned relation with their longitudinal axes coincident with the axis of the opening 38. The means 14 includes a pin 40 extending through the opening 38 and passing through the cutter openings 26 to project into the notches 23. The central portion of the pin 40 is of increased diameter and is closely received in the opening 38. The enlarged intermediate portion of the pin 40 extends from the opposite sides of the member 13 projecting a substantial distance into the cutters 11. The enlarged portion of the pin 40 stiffens and strengthens the pin where it is supported on the member 13. Flat outwardly facing shoulders 41 occur on the pin 40 at the ends of its enlarged intermediate portion. The pin 40 passes outwardly through the openings 26 of the cutters 11 with substantial clearance. The pin 40 terminates within the notches 23 having its ends spaced from the outer sides of the legs 19.

The means 14 for supporting the inner cutters 11 further includes bushings 42 arranged on the end portions or the smaller portions of the pin 40. The inner ends of the bushings 42 are engaged against the shoulders 41 while the outer ends of the bushings are at or adjacent the ends of the pin 40. The bushings 42 are graduated or stepped in external diameter, the inner portions of the bushings being the largest in diameter, the intermediate portions being somewhat reduced in diameter providing outwardly facing annular shoulders 43 and the end portions of the bushings being further reduced in diameter providing second outwardly facing shoulders 44. The inner shoulders 43 are located adjacent but outward of the shoulders 45 which occur in the cutters 11 at the inner ends of the sockets 27. The second or outer shoulders 44 of the bushings 42 are adjacent the ends of the cutters 11.

A ball race 46 is provided in the large inner portion of each bushing 42 and a mating or opposing race 47 is provided in the wall of the surrounding cutter 11. Series of balls 48 are arranged in the mating races 46 and 47 to assist in rotatably supporting the cutters 11 and to assume or transmit end thrusts to which the cutters may be subjected. Radial openings 49 extend inwardly in the bushings 42 from the races 46 to facilitate the introduction of the balls 48 into the races 46 and 47. Plugs 50 close the openings 49 to retain the balls in place. Pins or lugs 51 on the plugs 50 cooperate with keyways or notches 52 in the inner walls of the bushings 42 to hold the plugs 50 against turning and to prevent outward movement of the plugs. The plugs 50 are shaped so that their outer ends form unbroken continuations of the races 46. It will be seen that the balls 48 engaged in the mating races 46 and 47 assist in transmitting radial loads and hold the cutters 11 against axial movement in both directions.

In addition to the ball bearing means just described the cutter mounting means 14 includes roller bearings for mounting the cutters 11 on the pin 40 and the bushings 42. Series of anti-friction rollers 53 are arranged in the inner portions of the cutters 11 between the bosses 39 and the inner ends of the bushings 42. The bosses 39 and the bushings 42 operate to hold the rollers 53 against axial displacement. It will be observed that the rollers 53 are engaged on the large diametered intermediate portion of the pin 40 and are directly received in the cutter openings 26. Second sets of rollers 54 are arranged in the sockets 27 in the outer parts of the cutters 11 to bear on the intermediate portions of the bushings 42. The shoulders 43 serve to limit inward axial movement of the rollers 54. It is preferred to provide washers 55 on the bushings 42 to engage against the faces 20 of the legs 19. The washers 55 may be shaped to enter the sockets 27 and engage against the shoulders 44. The outward ax-

ial movement of the rollers 54 is limited by the washers 55. The washers 55 in addition to limiting outward movement of the rollers 54 prevent the cutters 11 from wearing against the legs 19. The opposite end portions of the inner roller cutters 11 are dependably supported by the sets of anti-friction rollers 53 and 54 and the series of balls 48 are spaced between the sets of rollers to assist in mounting the cutters and to assume end thrusts in both directions.

The means 15 for supporting the outer cutters 12 mount the cutters 12 between the legs 21 and the faces 36 to have independent rotation about downwardly and inwardly inclined axes. The means 15 include bushings 56 on the extensions 37 of the member 13. The bushings 56 engage against the faces 36 and have their outer ends at or slightly beyond the outer ends of the extensions 37. Ball races 57 are formed in the bushings 56 to register with races 58 formed in the walls of the cutter openings 28. Series of balls 59 are provided in the races 57 and 58. Radial openings 60 extend through the bushings 56 to the races 57 to facilitate the insertion of the balls 59 into the races 57 and 58. Plugs 61 occupy the openings 60 to retain the balls 59 in the races. The outer ends of the plugs 61 are shaped to conform to the walls of the races 57. Keys or lugs 62 on the inner ends of the plugs 61 cooperate with keyways 63 in the bushings 56 to hold the plugs 61 against turning and outward movement. The balls 59 engaged in the races 57 and 58 assist in rotatably supporting the cutters 12 and assume or transmit end thrusts in both directions.

The means 15 for rotatably mounting the outer cutters 12 further include shafts or pins 64 secured to the extensions 37 of the member 13. The pins 64 are larger in diameter than the extensions 37 and their inner ends engage against the outer ends of the bushings 56 to positively hold the bushings against endwise movement. In accordance with the invention the pins 64 are threadedly secured to the extensions 37. In the construction illustrated reduced stems 65 on the inner ends of the pins 64 thread into sockets 66 in the extensions 37 to attach the pins to the extensions. The pins 64 extend outwardly to the body legs 21 and are received in the openings 24. In the form of the invention illustrated in Fig. 3 heads 67 of enlarged diameter are provided on the outer ends of the pins 64 and fit the inner parts of the openings 24. The inner sides of the heads 67 form inwardly facing shoulders 68. These shoulders 68 lie in planes adjacent and inward of the faces 22 on the inner sides of the legs 21.

Anti-friction elements are provided to engage between the cutters 12 and the pins 64. In the preferred construction series or sets of anti-friction rollers 69 are provided to bear on the pins 64 to assist in rotatably supporting the outer cutters 12. The inner ends of the pins 64 cooperate with the bushings 56 to hold the bushings against endwise movement and the inner ends of the rollers 69 may engage against the bushings 56 to prevent or limit inward movement of the rollers. The shoulders 68 operate to limit or prevent outward movement of the rollers 69 and prevent the rollers from rubbing and wearing against the faces 22 of the body legs 21. It will be seen that the outer cutters 12 are partially supported on the integral extensions 37 of the member 13 by the balls 59 and the bushings 56 and are partially supported on the large diametered pins 64 by the rollers 69.

In accordance with the invention elements of the means 14 for mounting the inner cutters 11 and elements of the means 15 supporting the outer cutters 12 are integrally joined with body parts to tie the various elements together and to dependably mount the several cutters. Welds 70 are provided in the slots or notches 23 to integrally join the bushings 42, the pin 40 and washers 55 with the body legs 19. The opposite ends of the pin 40 are exposed at the ends of the bushings 42 so that the welds 70 connect the pin and bushings and join the pin and bushings with the body legs 19. The welds 70 may fully occupy the portions of the slots or notches 23 not occupied by the bushings 42 and the pin 40. As shown in Figs. 1 and 2 of the drawings, the upper sides of the bushings 42 may directly bear against the walls of the slots or notches 23 and the welds 70 may extend across the outer ends of the bushings 42 and the pin 40 and may fully occupy the lower portions of the notches 23. It will be observed that the welds 70 are freely accessible to be readily formed and to be ground off or finished flush with the faces of the legs 19. The pins 64 which are threadedly connected to the extensions 37 of the member 13 are integrally joined with the body 10 by welds 71 in the openings 24. The heads 67 of the pins 64 fit or engage in the inner parts of the openings 24 and have their outer ends spaced from the mouths or outer ends of the openings, leaving ample spaces for the welds 71. Reduced stems 72 may extend outwardly from the pin heads 67. The welds 71 may fully occupy the portions of the openings 24 not occupied by the head 67 and the stems 72. The outer ends of the welds and the stems 72 may be ground off or finished flush with the outer faces of the legs 21. The welds 71 integrally connecting the pins 64 and the legs 21 of course prevent unthreading of the stems 64 from the sockets 66 and connect the pins with the body 10 so that the pins form ties between the body legs 21 and the support member 13.

Fig. 4 of the drawings illustrates a slightly modified means for rotatably mounting the outer cutters 12. In this construction the bushings 56, the rollers 69, the extensions 37, the ball bearings 59 and the stems 65 are the same as in the previously described form of the invention. The structure of Fig. 4 differs from the construction illustrated in Fig. 3 in that the pins 64^a are devoid of the heads 67. The pins 64^a may be uniform in diameter except for their reduced stems 65 and 72 and are proportioned to have their major intermediate parts project into the openings 24^a in the body legs 21. The openings 24^a are formed to rather accurately receive the pins 64^a. Welds 71^a are provided in the openings 24^a to join the pins 64^a and the body legs 21. In this construction the faces 22 of the body legs 21 serve to limit outward axial shifting of the rollers 69.

In assembling the bit the pin 40 is arranged in the opening 38 of the support member 13 to have portions of equal length project from the opposite sides of the member. The bushings 42 are inserted in the cutters 11 and the balls 48 are passed through the openings 49 to occupy the races 46 and 47. The plugs 50 are then arranged in the openings 49 to retain the balls. The outer sets of rollers 54 are assembled in the cutters 11 and the inner rollers 53 are as-

sembled about the enlarged portion of the pin 40. The washers 55 are arranged against the outer sides of the cutters 11 and the cutters are slid onto the pin 40. If desired the cutters 11 may be partially engaged on the pin 40 prior to assembling the rollers 53 on the pin. It is to be understood that the cutters 11 with their bearing elements may be individually assembled on the pin 40.

The outer cutters 12 are then prepared for arrangement on the member 13. The bushings 56 are inserted in the cutters 12 and the balls 59 are passed through the openings 60 into the races 57 and 58 whereupon the plugs 61 are arranged to close the openings 60. The cutters 12 containing their bushings 56 are placed on the extensions 37 and the rollers 69 are arranged in the cutters to engage against the bushings 56. Heavy grease may be placed around the rollers 69 to retain them in position.

The assembly of the member 13 and the four cutters 11 and 12 is then placed on the body 10 in a position where the ends of the pin 40 and the bushings 42 are received in the notches 23. This brings the outer sides of the cutters 12 adjacent the faces 22 of the legs 21 there being slight running clearance between the cutters and these faces. The pins 64 and 64a, as the case may be, are then passed in through the openings 24 or 24a and their stems 65 are threaded in the sockets 66 so that the pins are secured to the member 13 and pass through the series of rollers 69. With the assembly of the cutters and their supporting member 13 in the proper position the assembly is fixed in this position by welding the stem 32 to the body 10 at 35, and forming the welds 70 and 71. The welds 70 and 71 are easily reached with the welding rod and are readily accessible to be finished or smoothed off when completed. The weld 35 is substantially hidden from view and it is unnecessary to grind or finish it.

It is to be understood that the wear receiving surfaces of the cutters 11 and 12, the pin 40, the bushings 42, the bushings 56 and the pins 64 and 64a may be provided with hard wear resisting surfaces. The body legs 19 and 21 may be heat treated to be tough and shock resistant. It is to be particularly noted that the hard surfaced pins 64 are integrally joined with the heat treated legs 21 so that hard surfaced cutter supports are provided on the shock resistant body legs. The pins 64 and 64a are of large diameter, forming strong ties between the member 13 and the body legs 21 which have large areas or cross sections to resist shear stresses. The direct engagement of the rollers 53 with the pin 40 permits the employment of inner cutters 11 of increased wall thickness, particularly at the inner ends of the cutters and this, in turn, permits the employment of deeply cut teeth 25. These deep teeth 25 do not become mudded up or clogged with cuttings and mud in sticky formations where shallower teeth soon become useless. The improved roller bit of the invention is strong, dependable and long wearing.

Having described only typical preferred forms and applications of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. In a rock bit, a bit body having spaced legs on its lower end, the lower part of each leg having an opening, a support member spaced between the legs and having a transverse opening aligned with the openings in the legs, a generally horizontal one piece pin having an intermediate portion of increased diameter bearing in said opening in the support member and having its end portions extending into the openings in the legs and rigidly fixed to the legs, and roller cutters rotatably mounted on the pin between the support member and the legs.

2. In a rock bit, a bit body having spaced legs on its lower end, a support member spaced between the legs and having a transverse opening, a generally horizontal pin having an intermediate portion of increased diameter bearing in said opening and having its ends fixed to the legs, roller cutters around the pin at each side of the support member, anti-friction elements directly engaging said intermediate portion of the pin and the cutters to assist in rotatably mounting the cutters, bushings on the pin at each end of said intermediate portion, and anti-friction elements on the bushings assisting in rotatably mounting the cutters.

3. In a rock bit, a body, a first pair of diametrically opposite legs projecting from the body, a second pair of diametrically opposite legs projecting from the body and spaced between the first legs, a support member projecting downwardly from the lower end of the body and having a transverse opening aligned with the first legs, a one piece pin bearing in said opening and projecting from opposite sides thereof to the first legs, means fixing the pin to the first legs, inner roller cutters rotatably mounted on the pin, pins threadedly secured to the support and projecting outwardly therefrom to said second legs, and outer roller cutters rotatably mounted on the second mentioned pins.

4. In a rock bit, a body, a first pair of diametrically opposite legs projecting from the body, a second pair of diametrically opposite legs projecting from the body and spaced between the first legs, a support member secured to the body to project from the lower end thereof and having a transverse opening, an integral pin having an intermediate portion of enlarged diameter bearing in said opening, the pin projecting from opposite sides of the support member to the first legs, inner roller cutters rotatably mounted on the pin, bearing pins threadedly secured to the support and projecting outwardly therefrom to said second legs, welds integrally joining the first named pin with said first legs, welds integrally joining said bearing pins with said second legs, and outer roller cutters rotatably mounted on the second mentioned pins.

5. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member projecting downwardly from the lower end of the body and spaced between the legs, bearing pins threadedly secured to the member and projecting outwardly to the legs, welds integrally joining the bearing pins with the legs whereby the pins serve to tie the legs and member together, and roller cutters rotatably supported on the bearing pins.

6. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member at the lower end of the body between the legs, extensions on opposite sides of the member projecting upwardly and outwardly toward the legs, pins threadedly secured to the extensions and extending upwardly and outwardly to

the legs, welds securing the pins to the legs, and outer roller cutters rotatably supported on the extensions and pins.

7. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member at the lower end of the body between the legs, extensions on opposite sides of the member projecting upwardly and outwardly toward the legs, pins threadedly secured to the extensions and extending upwardly and outwardly to the legs, welds securing the pins to the legs, the pins being larger in diameter than the extensions, roller cutters around the extensions and pins, anti-friction elements rotatably supporting the cutters on the pins, bushings on the extensions, and anti-friction elements rotatably supporting the cutters on the bushings.

8. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member at the lower end of the body between the legs, extensions on opposite sides of the member projecting upwardly and outwardly toward the legs, pins threadedly secured to the extensions and extending upwardly and outwardly to the legs, welds securing the pins to the legs, the pins being larger in diameter than the extensions, roller cutters around the extensions and pins, anti-friction elements rotatably supporting the cutters on the pins, bushings on the extensions held between the support member and the inner ends of the pins, and anti-friction elements rotatably supporting the cutters on the bushings for the transmission of end thrusts in both directions.

9. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member at the lower end of the body between the legs, socketed extensions formed integral with the member and projecting outwardly and upwardly therefrom toward the legs, the legs having openings aligned with the extensions, pins passed through the openings and threaded into the extensions to be fixed thereto and to have engagement in the openings, welds in the openings integrally joining the pins and legs, roller cutters around the extensions and pins, and means mounting the roller cutters on the pins and extensions.

10. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member at the lower end of the body between the legs, integral extensions on the opposite sides of the member, the legs having openings aligned with the extensions, pins passed in through the openings and threaded with the extensions, enlarged heads on the pins received in the openings, bearing means on the extensions and pins between the heads and legs, and roller cutters rotatably carried by the bearing means.

11. In a rock bit, a body having a pair of substantially diametrically opposite legs, a support member at the lower end of the body between the legs, integral extensions on the opposite sides of the member, the legs having openings aligned with the extensions, pins passed in through the openings and threaded with the extensions, enlarged heads on the pins received in the openings, welds in the openings integrally joining the heads with the legs, bearing means on the extensions and pins between the heads and legs, and roller cutters rotatably carried by the bearing means.

12. In a rock bit, a bit body, a pair of substantially diametrically opposite legs on the lower end of the body, the lower ends of the legs having notches, a support projecting from the lower end of the body and spaced between the legs, the support having a transverse opening, a substantially horizontal pin passed through said opening to bear therein and having its end portions received in the notches, bushings on the pin extending into the notches, welds in the notches integrally joining the pin and bushings with the legs, and cutters rotatably supported on the bushings.

13. In a rock bit, a bit body, a pair of substantially diametrically opposite legs on the lower end of the body, the lower ends of the legs having notches, a support projecting from the lower end of the body and spaced between the legs, the support having a transverse opening, a substantially horizontal pin having an intermediate portion of enlarged diameter received in said opening, the end portions of the pin extending into said notches, bushings on the pin having their inner ends engaging against the ends of said enlarged intermediate portion and having their outer portions extending into the notches, welds at the notches integrally connecting the bushings with the legs, roller cutters, and anti-friction means rotatably mounting the cutters on the bushings and pin.

14. In a rock bit, a bit body, a pair of substantially diametrically opposite legs on the lower end of the body, the lower ends of the legs having notches, a support projecting from the lower end of the body and spaced between the legs, the support having a transverse opening, a substantially horizontal pin having an intermediate portion of enlarged diameter received in said opening, the end portions of the pin extending into said notches, bushings on the pin having their inner ends engaging against the ends of said enlarged intermediate portion and having their outer portions extending into the notches, welds at the notches integrally connecting the bushings with the legs, shoulders on the bushings facing the inner sides of the legs, washers on the bushing between the shoulders and the inner sides of the legs, roller cutters, and bearings on the bushings and pin between the member and the legs rotatably supporting the cutters.

ALFRED C. CATLAND.