

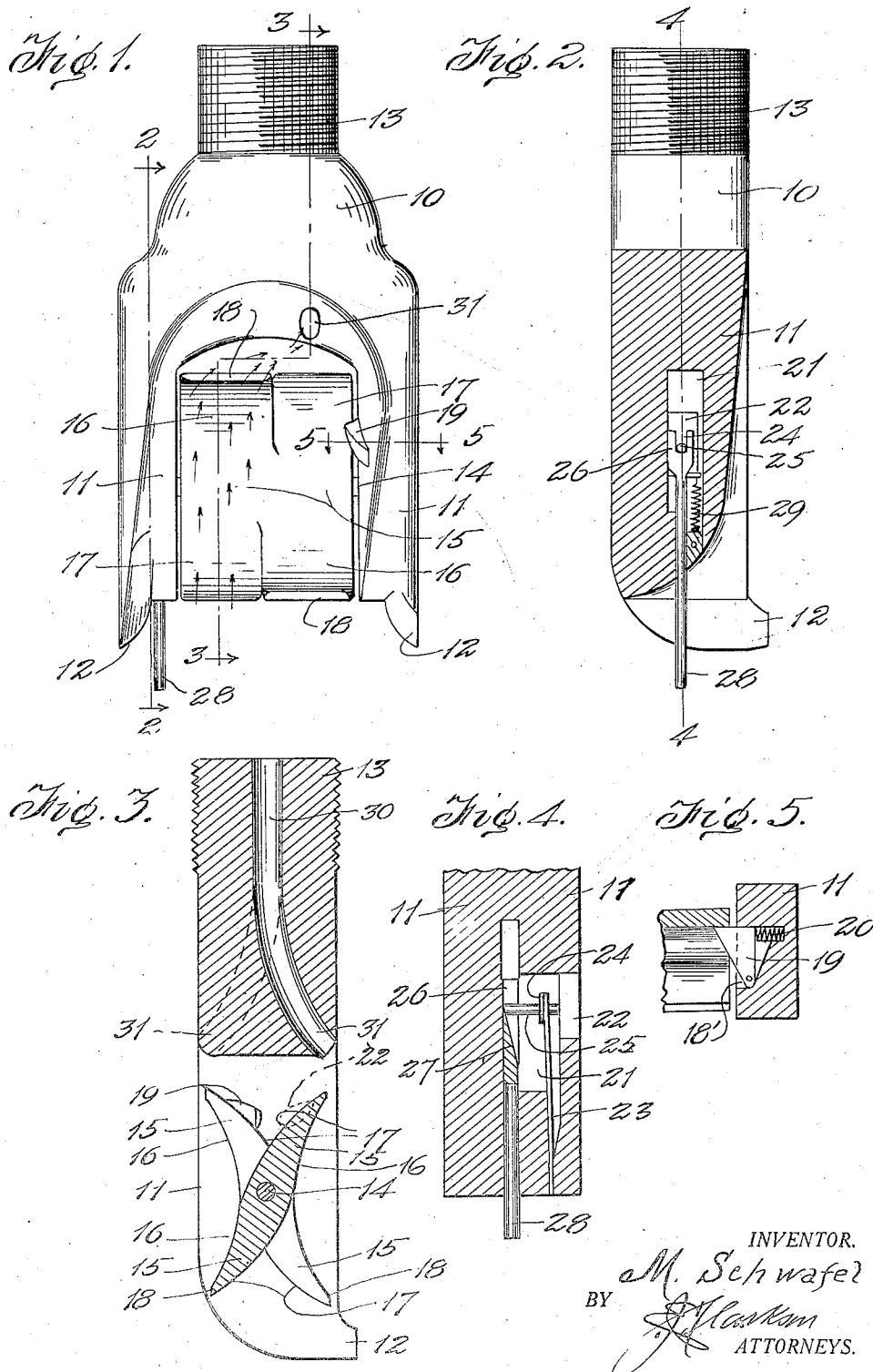
June 11, 1929.

M. SCHWAFEL

1,716,741

WELL DRILLING TOOL

Filed Nov. 13, 1928



INVENTOR.
M. Schwafel
BY *J. H. Kamm*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

MICHAEL SCHWAFEL, OF TAFT, CALIFORNIA.

WELL-DRILLING TOOL.

Application filed November 13, 1928. Serial No. 319,094.

This invention relates to well drilling tools such as are used in the drilling of oil wells and the like and has special reference to a rotary well drilling bit.

5 One important object of the invention is to improve the general construction of devices of this character.

A second important object of the invention is to provide an improved self sharpening bit for well drilling.

10 A third important object of the invention is to provide an improved bit having rotatably changeable cutters so arranged that the cutters out of service are automatically sharpened by the effects of the drilling operation.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and specifically claimed.

In the accompanying drawings like characters of reference indicate like parts in the several views, and:

Figure 1 is a front elevation of a drill bit constructed in accordance with this invention.

30 Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

35 Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a section on the line 5—5 of Figure 1.

In the construction of the bit as here shown there is provided a body 10 from which depends the parallel arms 11 rounded on their outer sides and having downwardly extending cutting edges 12 projecting from the outer portions of their ends. The upper end of the body terminates in a threaded boss 13 for attachment of the bit to the hollow drill stem commonly used in rotary well boring. Between the arms 11 extends a shaft 14 and on this shaft is pivoted a rotary cutter blade unit consisting of two pairs of blades 15, one pair on each side of the median plane and the blades of each pair extending in opposite directions from the shaft 14. Each of these blades has a concave forward face 16 and a convex rear face 17 approaching each other at the blade

edge which is formed by beveling off the concave edge portion as at 18.

One of the arms 11 is provided with a recess 18' wherein is pivoted a beveled pawl 19 pressed outward by a spring 20. This pawl is arranged to engage the rear sides of the upwardly extending blades of the pair of blades adjacent the said arm so that the blades will not rotate upon the bit being rotated in the cutting direction but the bevel 65 of the pawl permits the blades to rotate readily in the opposite direction.

In the other arm 11 is a recess 21 wherein is mounted a pawl 22 which is held normally retracted by a leaf spring 23 engaged 70 against a collar 24 formed on a stem 25 projecting inwardly of the recess from the pawl 22. A forked cam member 26 is slidably mounted in said recess to have its arms straddle the inner end of the stem 25 and 75 the bottom of the forked portion is beveled as at 27 to wedge the stem and pawl outwardly of the recess against the action of the spring 23. This projects the pawl behind to convex side 17 of that blade 15 of 80 the remaining pair which extends upwardly from the shaft, the blades under these conditions being locked from rotation in either direction by the action of the two pawls. The forked member is provided with a shank 85 28 which projects from the end of the arm 11 under the influence of a tension spring 29, the shank being pushed in when the bit is bottomed on the hole in drilling. By this construction the blades are locked against 90 all movement in either direction whenever the bit is in drilling position but when the bit is raised the blades may be rotated backwardly by the operator so that the idle cutting edges may be turned down into cutting 95 position and the previously used edge turned upwardly into sharpening position.

Through the body 10 and head 13 extends a passage 30 having its lower end branched to open on opposite sides of the head as at 100 31. These passages carry off the grit and mud from the bottom of the hole and this grit and mud, flowing in the direction of the arrows in Figure 1 rubs against the beveled portions of the upturned idle blades and thus 105 effectually sharpens them.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be 110

made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new, is:

10 1. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, means to limit rotation of the member to one direction only, and means controlled by
15 the position of the bit in a well and arranged to lock said member against rotation upon the bit being lowered to boring position.

2. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, means to limit rotation of the member to one direction only, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop
25 being normally retracted from said path, and means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of
30 said head.

3. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, means to limit rotation of the member to one direction only, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, means to project
35 said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, a spring normally holding said stop retracted, and a second spring normally holding said
40 stem protracted.

4. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, a pawl carried by one arm of the fork and spring pressed into the path of said cutter
45 member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction
50 and be stopped by the pawl upon movement in the opposite direction, and means controlled by the position of the bit in a well and arranged to lock said member against rotation upon the bit being lowered to boring position.
55 60

5. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, a pawl carried by one arm of the fork and spring pressed into the path of said cutter
65

member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon
70 movement in the opposite direction, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, and means to project
75 said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head.

6. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, a pawl carried by one arm of the fork and spring pressed into the path of said cutter
80 member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon
85 movement in the opposite direction, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, means to project
90 said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, a spring normally holding said stop retracted, and
95 a second spring normally holding said stem protracted.

7. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said
100 cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting
105 edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, means to limit rotation of the member to one direction only, and means controlled by the
110 position of the bit in a well and arranged to lock said member against rotation upon the bit being lowered to boring position.

8. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said
115 cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting
120 edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, means to limit rotation of the member to one direction only, a stop
125 130

carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, and means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head.

9. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, means to limit rotation of the member to one direction only, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, a spring normally holding said stop retracted, and a second spring normally holding said stem protracted.

10. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, a pawl carried by one arm of the fork and spring pressed into the path of said cutter member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon movement in the opposite direction, and means controlled by the position of the bit in a well and arranged to lock said member against rotation upon the bit being lowered to boring position.

11. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter

projecting downwardly into working position and the other end projecting upwardly, a pawl carried by one arm of the fork and spring pressed into the path of said cutter member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon movement in the opposite direction, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, and means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head.

12. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, a pawl carried by one arm of the fork and spring pressed into the path of said cutter member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon movement in the opposite direction, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, a spring normally holding said stop retracted, and a second spring normally holding said stem protracted.

13. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, means to limit rotation of the member to one direction only, and means controlled by the position of the bit in a well and arranged to lock said member against rotation upon the bit being lowered to boring position,

said bit body being provided with sludge passages terminating downwardly in ports positioned above the upwardly projecting cutter ends and to one side thereof whereby sludge passing into said ports will flow over the upper edge portions of the cutters to sharpen the same.

14. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, means to limit rotation of the member to one direction only, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, and means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, said bit body being provided with sludge passages terminating downwardly in ports positioned above the upwardly projecting cutter ends and to one side thereof whereby sludge passing into said ports will flow over the upper edge portions of the cutters to sharpen the same.

15. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, means to limit rotation of the member to one direction only, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, a spring normally holding said stop retracted, and a second spring normally holding said stem protruded, said bit body being provided with sludge passages terminating downwardly in ports positioned above the upwardly projecting cutter ends and to one side thereof whereby sludge passing into said ports will flow over the upper edge portions of the cutters to sharpen the same.

16. In a well drill bit, a forked body, a

rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, a pawl carried by one arm of the fork and spring pressed into the path of said cutter member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon movement in the opposite direction, and means controlled by the position of the bit in a well and arranged to lock said member against rotation upon the bit being lowered to boring position, said bit body being provided with sludge passages terminating downwardly in ports positioned above the upwardly projecting cutter ends and to one side thereof whereby sludge passing into said ports will flow over the upper edge portions of the cutters to sharpen the same.

17. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, a pawl carried by one arm of the fork and spring pressed into the path of said cutter member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon movement in the opposite direction, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, and means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, said bit body being provided with sludge passages terminating downwardly in ports positioned above the upwardly projecting cutter ends and to one side thereof whereby sludge passing into said ports will flow over the upper edge portions of the cutters to sharpen the same.

18. In a well drill bit, a forked body, a rotatable cutter blade member mounted in the fork to revolve on a horizontal axis, said

cutter member consisting of two double ended cutters arranged on opposite sides of the axis of revolution of the bit and connected to revolve together, each end of each cutter being provided with a sharp cutting edge at its free end, one end of each cutter projecting downwardly into working position and the other end projecting upwardly, a pawl carried by one arm of the fork and spring pressed into the path of said cutter member, said pawl having one face beveled and a second face at right angles to the path of said cutter member whereby the cutter member may rotate past the pawl in one direction and be stopped by the pawl upon movement in the opposite direction, a stop carried by one arm of the fork and projectable into the path of revolution of the cutter member, said stop being normally retracted from said path, means to project said stop into said path and including a stem normally projecting downwardly from the head to engage the bottom of the drill hole and be forced upwardly of said head, a spring normally holding said stop retracted, and a second spring normally holding said stem protracted, said bit body being provided with sludge passages terminating downwardly in ports positioned above the upwardly projecting cutter ends and to one side thereof whereby sludge passing into said ports will flow over the upper edge portions of the cutters to sharpen the same.

In testimony whereof I affix my signature.

MICHAEL SCHWAFEL.