No. 854,570. PATENTED MAY 21, 1907.

R. M. DOWNIE.

CORE DRILL.

APPLICATION FILED FEB. 18, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

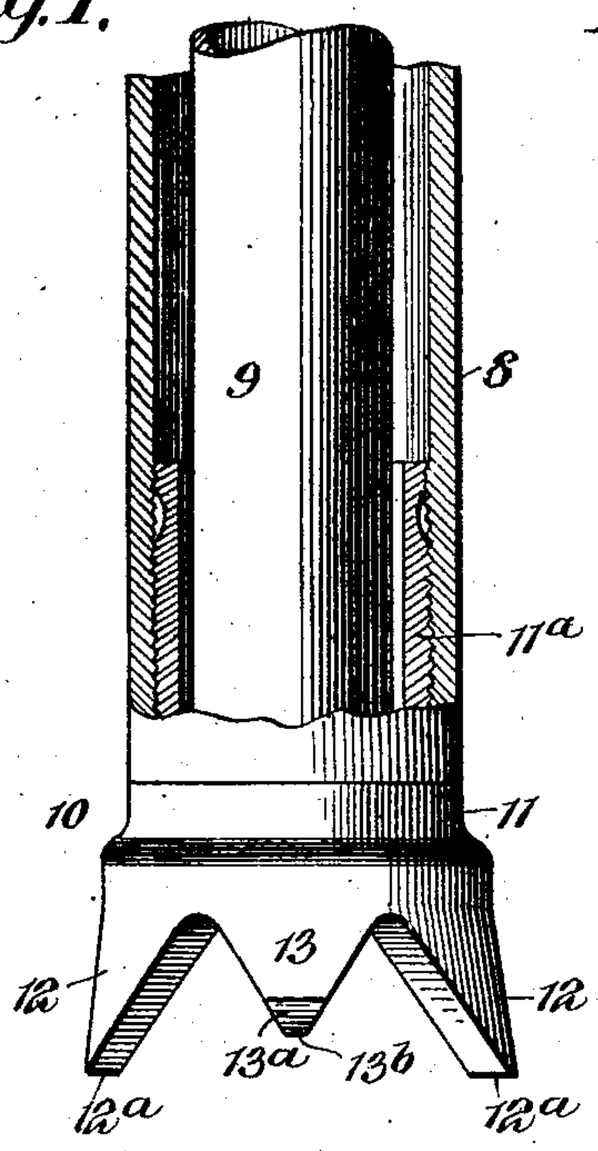


Fig. 2.

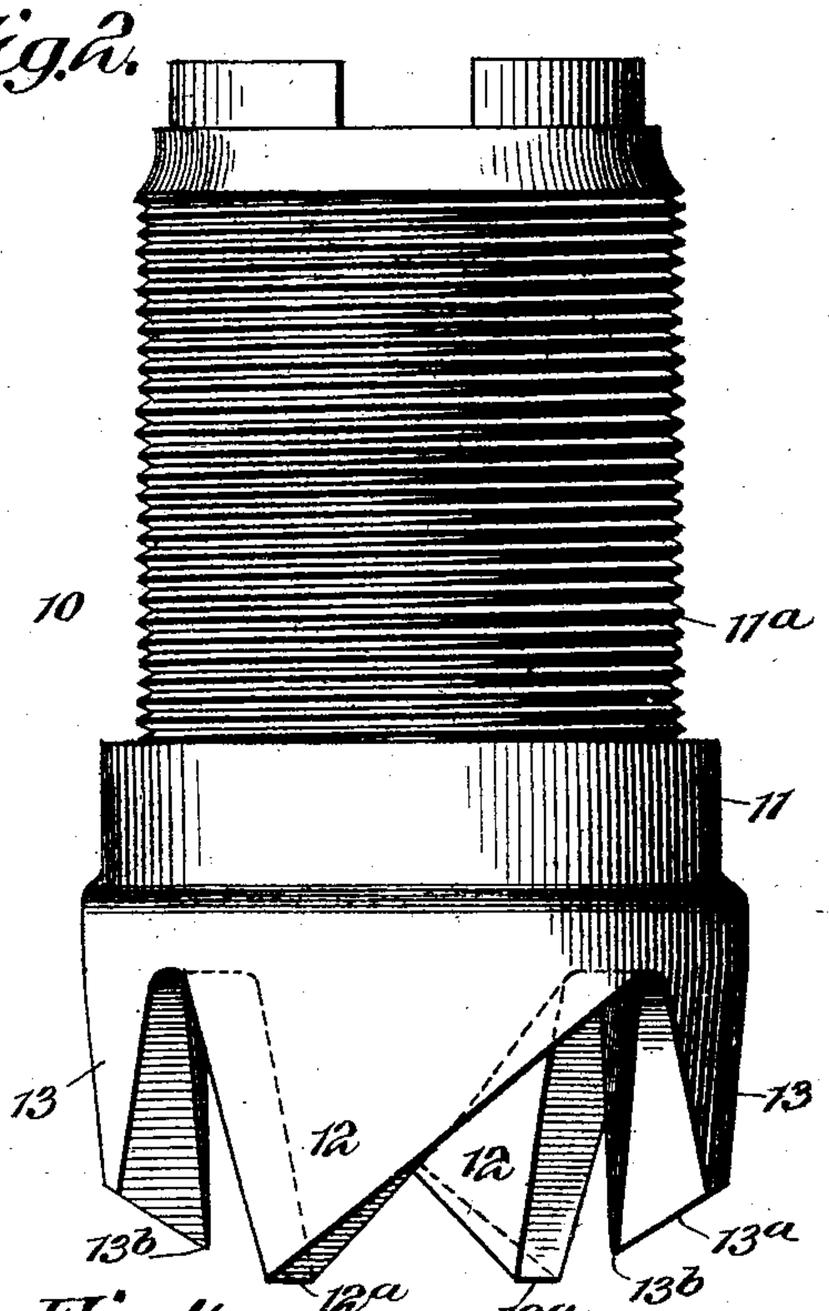


Fig. 3.

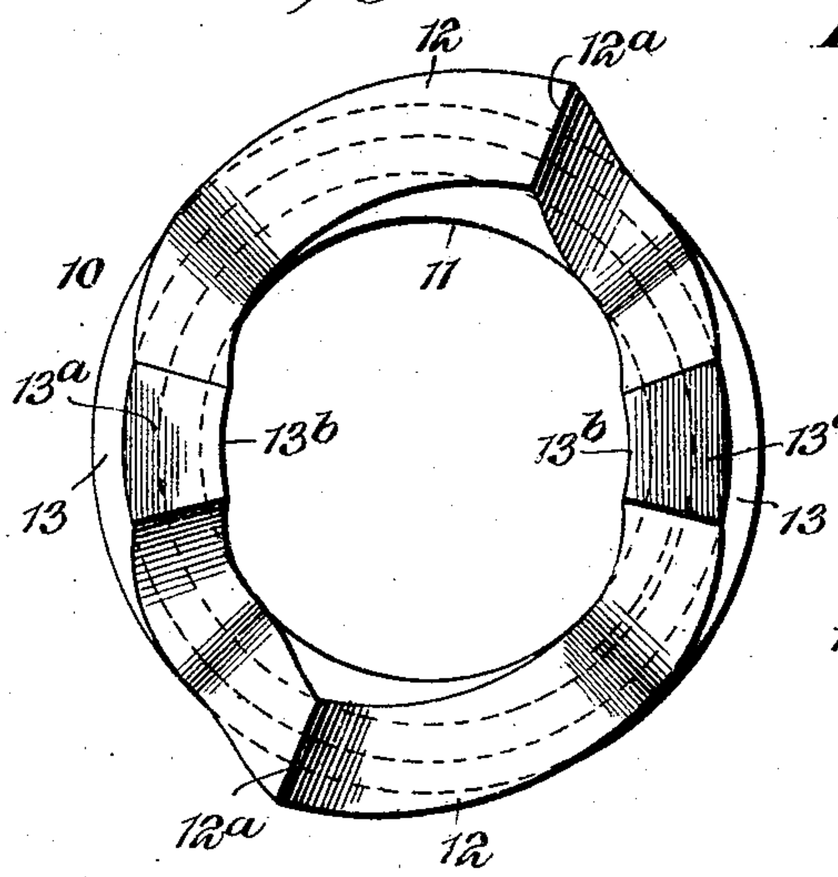
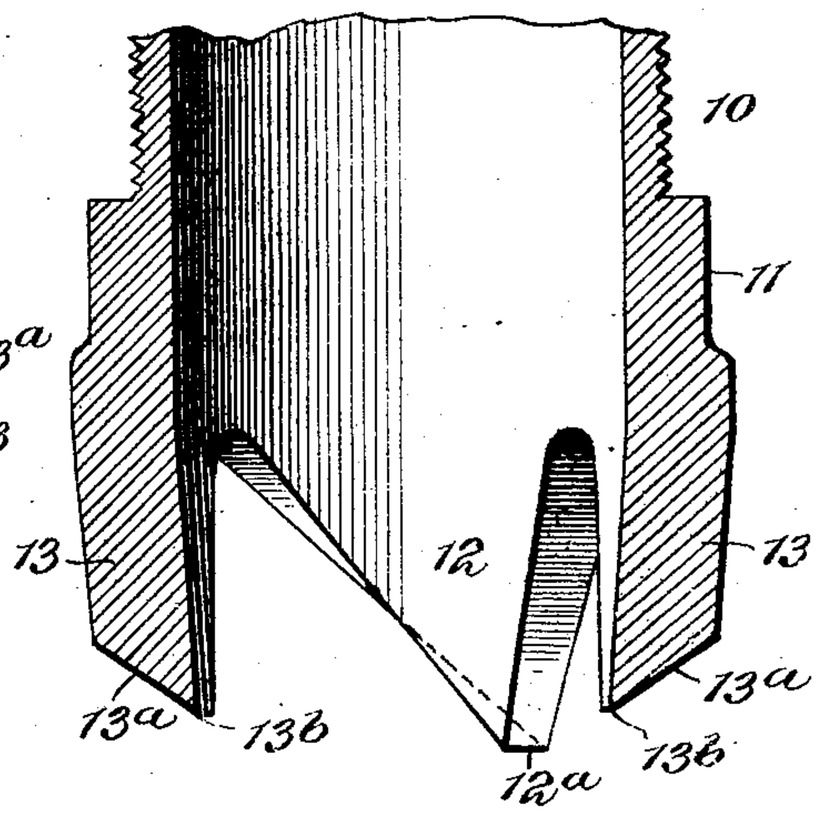


Fig. 4.



Witnesses
Howard D. Orr.
B. L. Fenter

Robert M. Downie, Inventor,
By E. G. Siggers.
Attorney

No. 854,570. PATENTED MAY 21, 1907.

R. M. DOWNIE.

CORE DRILL.

APPLICATION FILED FEB. 18, 1907.

2 SHEETS—SHEET 2.

Fig. 5.

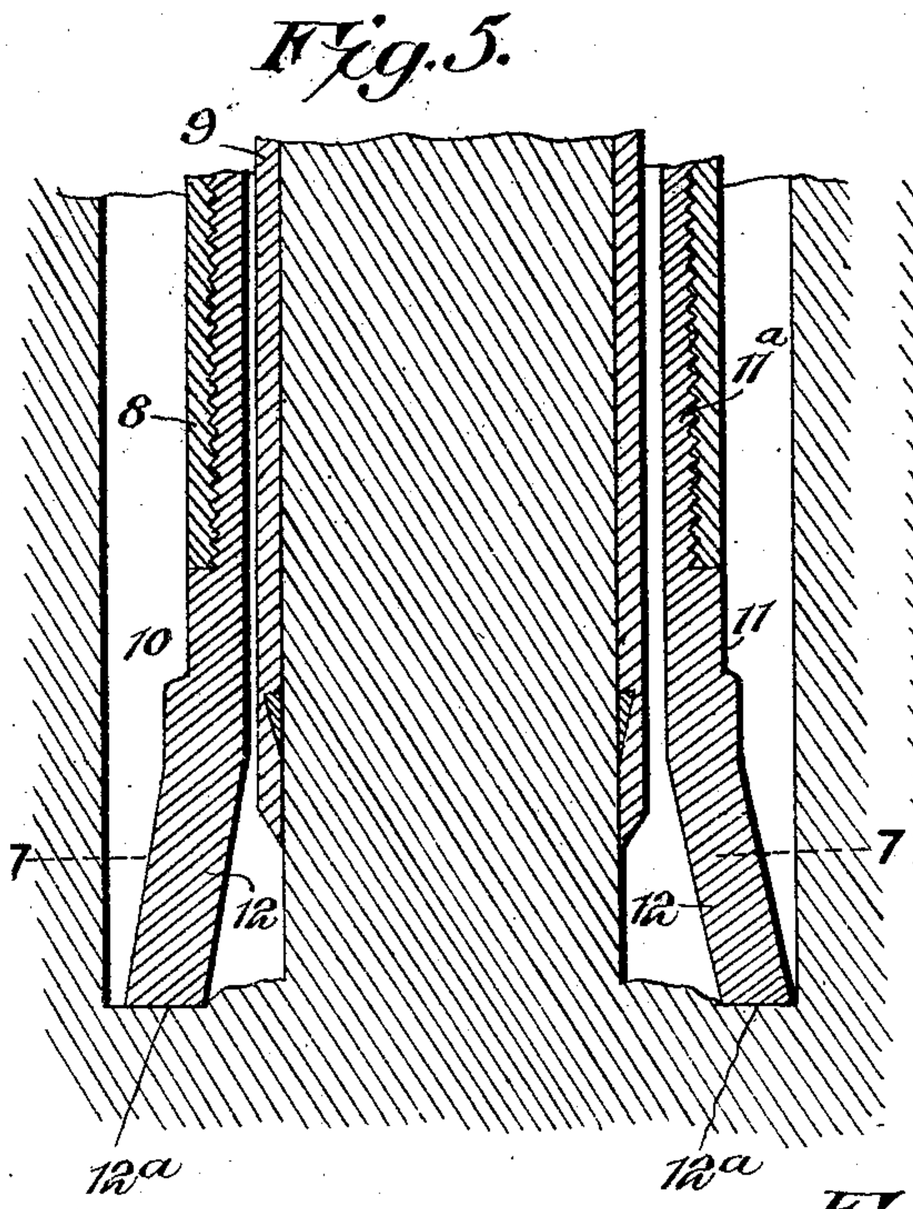


Fig. 6.

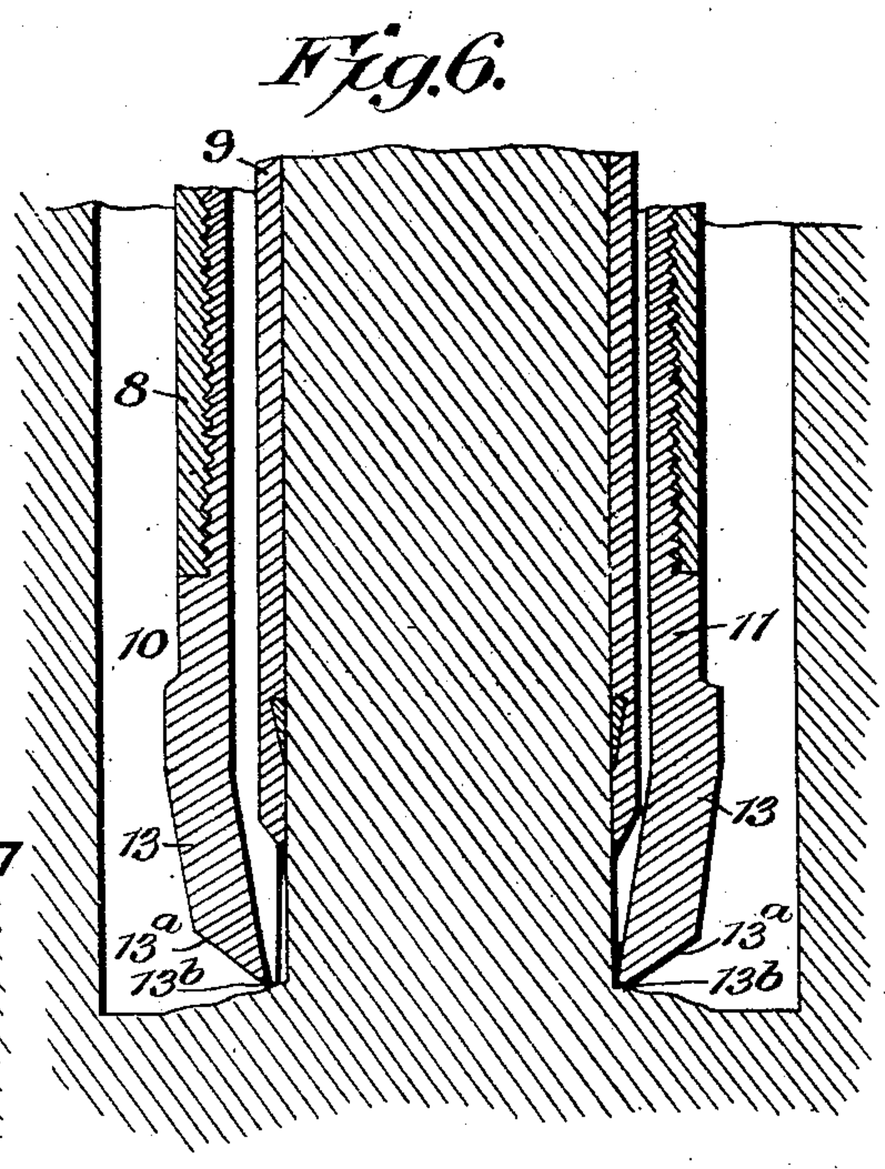
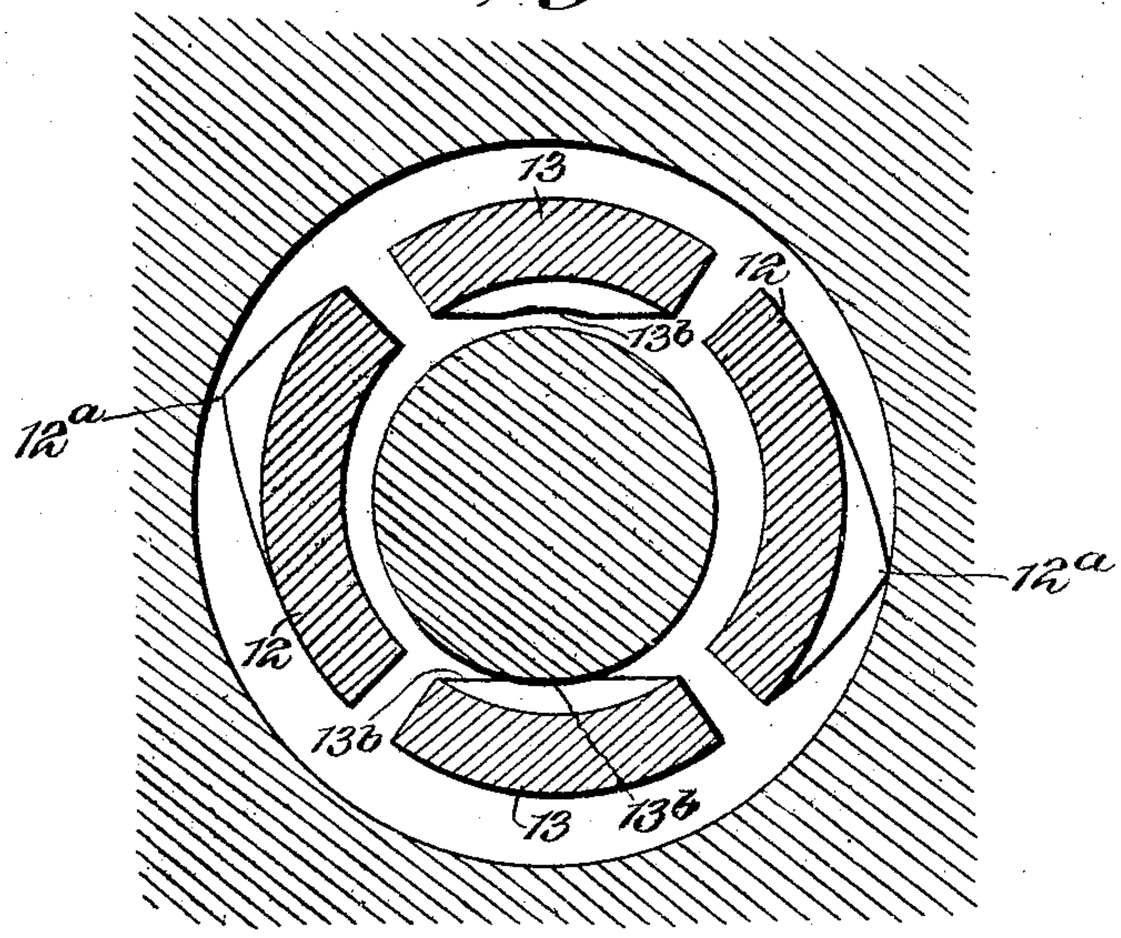


Fig. 7.



Witnesses
Howard D. Orr.
B. H. Porter.

Robert M. Downie, Inventor,
By E. G. Siggers.
Attorney

UNITED STATES PATENT OFFICE.

ROBERT M. DOWNIE, OF BEAVER FALLS, PENNSYLVANIA, ASSIGNOR TO KEYSTONE DRILLER CO., OF BEAVER FALLS, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CORE-DRILL.

No. 854,570. Specification of Letters Patent. Patented May 21, 1907.

Application filed February 18, 1907. Serial No. 358,038.

To all whom it may concern:

Be it known that I, ROBERT M. DOWNIE, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Core-Drill, of which the following is a specification.

The present invention relates more particularly to means for forming cores in bore holes by means of the reciprocatory or percussion type of drill, and said invention appertains to drills of the character covered by the broad claims in Patent Number 848,227, granted to me on March 26, 1907.

The primary object of the present invention is to provide a structure that is more simple in its nature, and has a number of novel features not forming part of the mechanism set forth in the aforementioned application, said structure at the same time having all the advantages incident to this type of mechanism.

An embodiment of the invention that is at present considered the preferable one is disclosed in the accompanying drawings, wherein:—

Figure 1 is a view partly in elevation and partly in section of the lower portion of a core drill. Fig. 2 is a side elevation of the drill bit or body. Fig. 3 is a bottom plan view of the same. Fig. 4 is a longitudinal sectional view therethrough. Fig. 5 is a detail sectional view illustrating the structure when in use and in a well. Fig. 6 is a similar view taken at right angles to Fig. 5. Fig. 7 is a horizontal sectional view taken substantially on the line 7—7 of Fig. 5.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment disclosed, a portion of a reciprocatory drill stem is shown, and is designated 8, the same being tubular in form. Within this stem is slidably mounted a core-receiving tube or core barrel 9, the said barrel being of considerably less diameter than the tubular stem, and said stem being capable of a lateral movement with respect to the barrel. A cutter 10 is carried by the lower end of the stem, and comprises a tubular body 11 having an upstanding portion 11^a that is exteriorly threaded, and is screwed into the lower end of the stem. The core barrel 9 is slidable through the cutter body, and is of less diameter than the bore of the same, so that the drill and stem can swing laterally with respect to the barrel. This it is thought will be clearly evident by reference to Figs. 1, 5 and 6.

Carried by the lower end of the cutter body, are diametrically opposite depending channel cutting teeth 12, which are tapered, as shown, and are inclined or set outwardly. These teeth preferably come to points at their lower ends, and have cutting edges 12^a disposed substantially radially to the longitudinal axis of the cutter. It will be observed that but a single tooth is employed on each side, and between the teeth 12 are located core trimming teeth 13, the latter teeth being also tapered and spaced from the teeth 12. The core trimming teeth are inset and are shorter than the teeth 12. Moreover their lower ends are beveled as shown at 13^a, thereby producing cutting edges 13^b that are located in line with the bore of the stem and the body, and are disposed longitudinally of the walls thereof, said edges being preferably curved, as illustrated in Fig. 3.

The operation of the drill may be briefly outlined as follows:— In the first place, it is to be remembered that the same is reciprocated by means of a cable in the ordinary manner, and it will be evident that with a drill of this kind, the bottom of the drill hole or channel will, of necessity, be rough. Moreover, it is a fact that in the operation of all reciprocatory drills, the hole is of greater diameter than the drill. This is necessary in order to afford clearance and easy working space for the drill. Therefore the present structure will be capable of slight lateral movement in the drill hole, but this movement will be limited by the drill body striking the core barrel, which is of course held against lateral movement, as will be evident by reference to Figs. 5 and 6. In the reciprocation of the drill upon almost every descent, one or the other of the outside channel cutting teeth 12 will strike a high place, on the rough bottom of the hole, an instant before the opposite tooth will strike. The downward force of the drill will consequently throw the striking tooth forward, while the inertia

of the drill will momentarily hold the opposite tooth against a like movement. Therefore owing to the slight clearance outside the outer cutter tooth, the one which has struck the high place as above, will describe a small portion of a circle whose center for the instant is the corresponding opposite tooth. This swinging or rotary movement will carry one of the inner core trimming teeth 13 beneath the lower end of the core barrel, so that it will engage and trim down the core, as shown in Fig. 6, but as the said swinging movement of the drill will be limited by the core barrel, as already shown, the trimming action will just be sufficient to allow the cover to pass into the barrel. At the next stroke, the swinging movement may be in an opposite direction, so as to carry the opposite core trimming tooth into action. This jostling or lateral movement therefore not only cuts the desired channel around the core but secures the proper operation of the core trimming teeth to produce a core, which will fit snugly into the core barrel. Moreover, it will be evident that with this structure, the core trimming teeth are shorter than the channel cutting teeth, and will not act as stops, or in any manner interfere with the lateral movement of the drill, and as they are provided with comparatively long cutting edges disposed longitudinally of the body wall and concentrically to the axis of the drill, their trimming action will be much more complete than if the said teeth were brought to a point.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. A percussion or reciprocatory core cutting drill having diametrically opposite single channel cutting teeth, and inset core trimming teeth located between the cutting teeth.

2. A percussion or reciprocatory core cutting drill, comprising a tubular body having substantially diametrically opposite single channel cutting teeth, and inset single core trimming teeth that have cutting edges disposed in line with the bore of the body.

3. A percussion or reciprocatory core cutting drill comprising a tubular body, tapered channel cutting teeth projecting from the lower end of the body, and tapered core trimming teeth having cutting edges disposed longitudinally of the body wall, said channel cutting and core trimming teeth having their lower portions spaced apart.

4. A percussion or reciprocatory core cutting drill, comprising a tubular body, outset channel cutting teeth projecting from the lower end of the body, and inset core trimming teeth having cutting edges disposed longitudinally of the body wall.

5. A percussion or reciprocatory core cutting drill, comprising a tubular body, tapered outset channel cutting teeth projecting from the lower end of the body, and tapered inset core trimming teeth having cutting edges disposed longitudinally of the body wall, said channel cutting and core trimming teeth having their lower portions spaced apart.

6. A percussion or reciprocatory core cutting drill, comprising a tubular body having channel cutting and core trimming teeth, one set of teeth being shorter than the other.

7. A percussion or reciprocatory core cutting drill comprising a tubular body having outset channel cutting and inset core trimming teeth, one set of teeth being shorter than the other.

8. A percussion or reciprocatory core cutting drill, comprising a tubular body having substantially diametrically opposite outset channel cutting teeth, and inset core trimming teeth that terminate short of the ends of the channel cutting teeth.

9. A percussion or reciprocatory core cutting drill, comprising a tubular body having substantially opposite outset channel cutting teeth, and inset core trimming teeth, one set of teeth being shorter than the other.

10. A percussion or reciprocatory core cutting drill, comprising a tubular body having substantially diametrically opposite single channel cutting teeth that are outset, said teeth being tapered, and inset single core trimming teeth that are also tapered and terminate short of the channel cutting teeth, said core trimming teeth having their lower portions spaced from the channel cutting teeth and having cutting edges disposed longitudinally of the body wall.

11. The combination with a tubular core cutting barrel, of a core cutting drill comprising a tubular body loosely surrounding the barrel, substantially diametrically opposite single outset channel cutting teeth carried by the lower end of the body, and single inset core trimming teeth depending from the body between the outset teeth and operating beneath the core barrel.

12. The combination with a tubular core cutting barrel, of a core cutting drill comprising a tubular body loosely surrounding the barrel, substantially diametrically opposite single outset channel cutting teeth carried by the lower end of the body, and single inset core trimming teeth depending from the body between the outset teeth and operating beneath the core barrel, said latter

teeth being spaced from the outset teeth and having cutting edges disposed longitudinally of the body walls.

13. The combination with a tubular core cutting barrel, of a core cutting drill comprising a tubular body loosely surrounding the barrel, substantially diametrically opposite single outset channel cutting teeth carried by the lower end of the body, and single inset core trimming teeth depending from the body between the outset teeth and operating beneath the core barrel, said latter teeth being shorter than the outset teeth.

14. The combination with a tubular core cutting barrel, of a core cutting body loosely surrounding the barrel, substantially diametrically opposite outset channel cutting teeth carried by the lower end of the body, and tapered inset core trimming teeth depending from the body between the outset teeth and operating beneath the core barrel, said core trimming teeth being shorter than the outset teeth and having cutting edges disposed longitudinally of the body wall.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ROBERT M. DOWNIE.

Witnesses:
R. G. FORBES,
J. W. WILSON.