July 16, 1935. A. MILTNER 2,008,031

SELF LUBRICATING DRILL

Filed Jan. 31, 1934

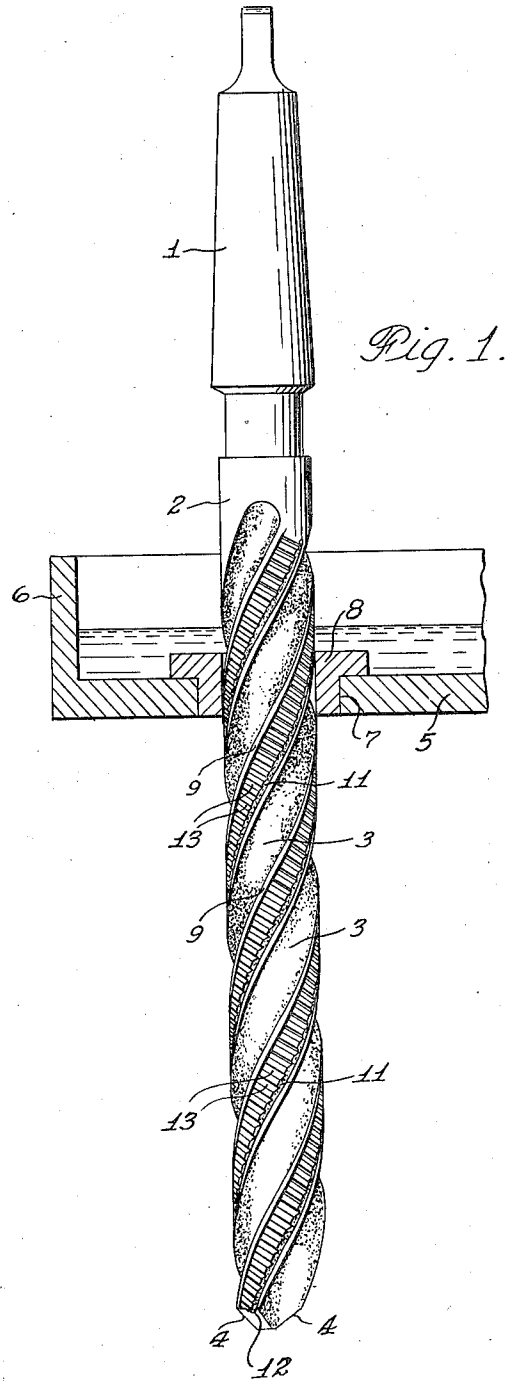


Fig. 1.

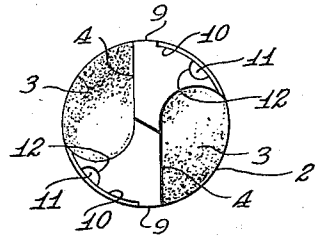


Fig. 2.

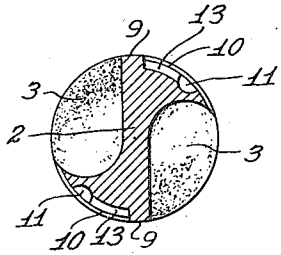


Fig. 3.

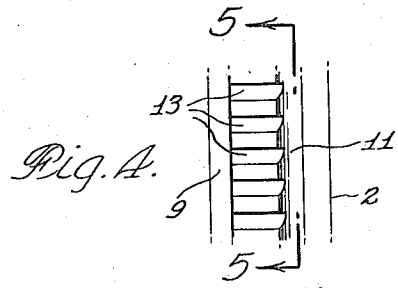


Fig. 4.

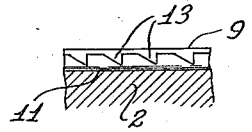


Fig. 5.

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SELF-LUBRICATING DRILL

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6 Claims. (Cl. 77—68)

The present invention pertains to a novel drill embodying means for flooding the same with lubricant during drilling operations.

It is essential that a drill be properly flooded with lubricant when drilling certain kinds of metal, such as for example, steel and wrought iron. Various drilling compounds are available on the market, some being compositions of animal or vegetable oils with cheap mineral or lubricating oils, and some being in the form of soapy emulsions. A great difference of opinion exists as to the essential properties of drilling compounds on the question of whether or not the function of the compound should be to cool the drill or whether it should cool and also lubricate. However the necessity for such a drilling compound is universally recognized, particularly in deep hole drilling operations wherein it is difficult to keep the drill cool. With conventional drills and flooding methods the drilling compound does not actually reach the cutting edge nor does the compound advance with the drill as it penetrates deep into the work.

The primary object of the present invention is to provide a drill embodying means for supplying a liquid drilling compound to the point of a drill as it penetrates into the work. In this connection the means referred to is not confined to the use of any particular drilling compound and accordingly the ingredients of the compound may be varied to provide a cooling action or to provide a lubricating and cooling action, and the same means may be embodied in different types and sizes of drills for use with different kinds of metals.

Another object of the present invention is to provide a drill embodying means for supplying drilling compound along the side and to the point of the drill, the means forming an integral part of the drill and being so constructed as to require the use of no external pressure means for pumping the compound to the point of the drill. In this connection the means is so constructed that the centrifugal force set up during operation of the drill is utilized in supplying fluid to the point of the drill.

With the above and other ends in view the invention consists in matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which—

Figure 1 is a side elevation of a drill, locating means associated therewith being illustrated in cross section;

Fig. 2 is an end view of the drill;

Fig. 3 is a transverse cross section;

Fig. 4 is a fragmentary developed view, and

Fig. 5 is a view taken on the line 5—5 of Fig. 5.

Like characters of reference are employed throughout to designate corresponding parts.

With reference to the drawing the numeral 1 designates the tapered shank of a drill 2 formed with spiral flutes 3 and cutting edges 4. This construction is obviously that of the conventional high speed drill and when in use the tapered shank is mounted in the rotatable chuck of a drilling machine. Inasmuch as drilling machines and chucks are well known in the art to which this invention pertains the same has not been illustrated in the drawing.

It is also well known in the art that when a large number of duplicate parts are to be drilled accurately a jig is ordinarily used. Various types of jigs are known but in its simplest form it merely comprises a plate containing holes conforming to the position of the holes to be drilled in the work. As illustrated in Fig. 1 the present drill is used in combination with a jig formed of a plate 5 having a marginal flange 6 extending vertically relative thereto. The plate 5 is formed with a definitely located hole 7 in which is received a drill bushing 8 through which the drill 2 extends, the drill being movable rotatably and longitudinally relative to the bushing. It will be understood that the jig plate 5 may be formed with one hole 6 to accommodate one drill after the manner shown or it may be formed with a plurality of holes for accommodating a plurality of drills. In other words the drill which forms the invention to be described may be used with either a single or multiple spindle drilling machine.

The lands 9 between the flutes 3 are relieved as at 10 and are also formed with spiral grooves 11. The spiral grooves 11 are disposed adjacent to the trailing edges of the respective lands and extend from a point adjacent to or higher than the upper ends of the flutes and open at their lower ends through the heel of the drill as designated at 12. Also formed in the lands are a plurality of grooves 13 which extend with their axes in an angular plane, as compared with a horizontal plane, when the drill is disposed with its axis in a vertical plane. The grooves 13 terminate at one end at approximately the point where the relieved portion begins in each land and their other ends open into the spiral grooves in the respective lands.

The grooves 13 are thus disposed in the lands so that they incline upwardly from their respective points of communication with the spiral

grooves 11 and the uppermost wall of each groove is formed in a plane at right angle to the longitudinal axis of the drill.

In operation the plate 5 is flooded with a liquid composed of ingredients providing the required cooling and lubricating action for the particular type of work involved. As the drilling operation begins the drill is moved longitudinally through the bushing 8 while it is at the same time being rotated so that it enters the work which is located beneath the jig 5. As the drill passes through the liquid in the trough formed by the marginal flange 6 on the jig 5 the liquid in the trough has a tendency to flow down the flutes 3 and spiral grooves into the hole formed by the entrance of the drill into the work. The tendency of the liquid to flow down the flutes is retarded, in fact in most cases it is entirely prevented, by the chips or cuttings which the flutes tend to carry to the surface. However the location of the spiral grooves 10 so that they open through the heel of the drill precludes the possibility of cuttings or chips entering these grooves to block off flow of liquid therethrough.

As the drill passes through the liquid in the trough each of the grooves 13 picks up a quantity of the liquid. Due to the inertia of the liquid and the high speed rotation of the drill the walls of the grooves 13 act as vanes to thrust the liquid downwardly and when the spiral grooves are closed by the wall of the bore formed by the entrance of the drill into the work the natural tendency of the liquid to move radially due to the centrifugal forces of such rotation is prevented and the tendency of the liquid to move downwardly is permitted. Thus each groove 13 picks up a quantity of the liquid and brushes it downwardly and into the spiral groove with which it is connected and inasmuch as each spiral groove is unobstructed the liquid may continue its downward movement by flowing down the spiral groove. In this manner the angular grooves 13 co-operate with the spiral grooves in carrying liquid to the heel of the drill as it enters the work.

By use of the present invention it is possible to maintain the sides of the drill in flooded condition and to induce a flooded condition at the lowermost point of the drill in the work. This function is attained by utilization of the natural forces through structure entirely contained by the drill and thus avoiding confusion with known devices having tubes imbedded in the sides of the drill and leading to the cutting end or oil holes extending through the drill and communicating with a stationary collar to which lubricant under pressure is supplied.

Although the specific embodiment of the present invention illustrated and described pertains to a drill having a spiral flute it will be understood, in view of the fact that straight flute drills are well known, that the present invention is equally applicable to drills having straight flutes.

What I claim is:—

1. In a drill having a flute and a land extending spirally of the drill, and wherein the land is formed with marginal leading and trailing edges, said land having a depressed zone spaced from and parallel with the leading edge, said zone presenting a facial configuration including a continuous channel spaced from but adjacent to and extending parallel with the trailing edge of the land, and successive substantially parallel channels extending substantially normal to and leading into such continuous channel, whereby the non-depressed zone of the land forms a barrier to the entrance of chips into the parallel channels and said latter channels serve to impel liquid trapped therein into said continuous channel in the direction of the drill point zone when the drill is rotated.

2. A drill as in claim 1 characterized in that the continuous channel is of greater depth than the parallel channels.

3. A drill as in claim 1, characterized in that the parallel channels extend from the leading side of the depressed zone.

4. A drill as in claim 1 characterized in that the parallel channels each include an angular cross-sectional configuration with one of the angular sides extending normally to the axis of the drill on the line of section.

5. A drill as in claim 1 characterized in that the parallel channels each include an angular cross-sectional configuration with the upper angular side extending normally to the axis of the drill on said line of section.

6. A drill as in claim 1 characterized in that the parallel channels are of less depth than the continuous channel and lead from the leading side of the depressed zone.

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