

PUBLISHED

MAY 25, 1943.

BY A. P. C.

J. KEÜLERS

HOLLOW ROD CONNECTION

Filed April 18, 1939

Serial No.

268,505

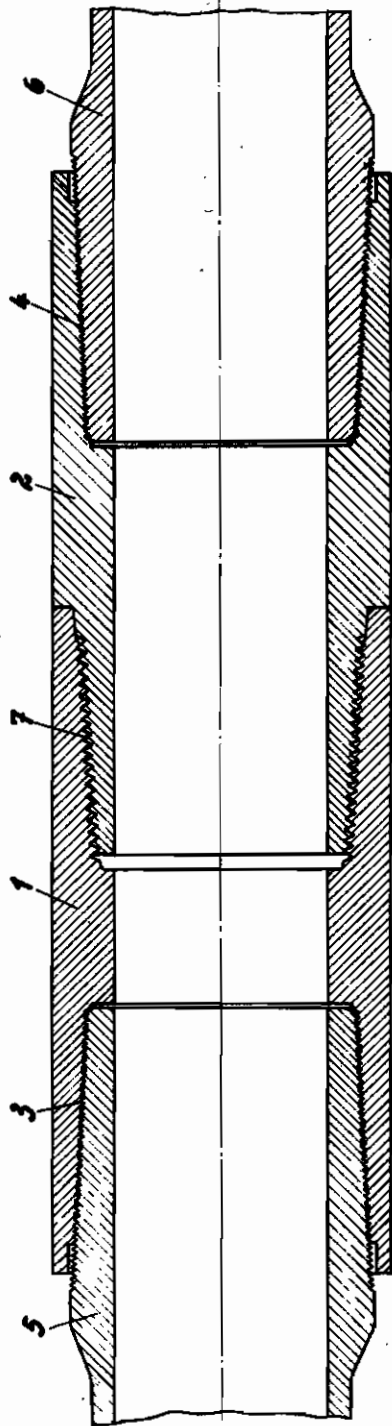


Fig. A

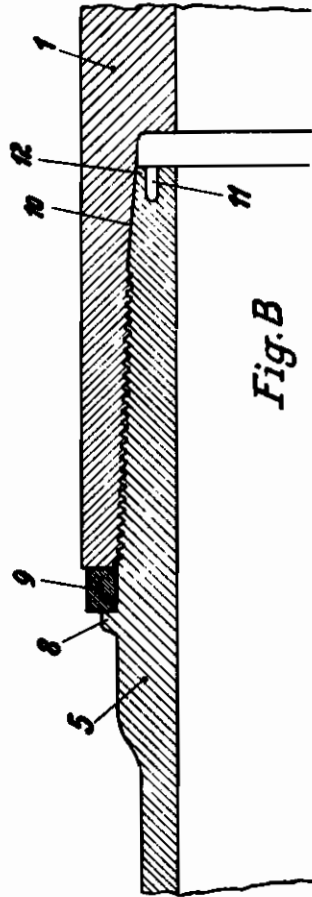


Fig. B

Inventor:

Jacob Keulers

By *W. H. H. H.*

his ATT'Y.

ALIEN PROPERTY CUSTODIAN

HOLLOW ROD CONNECTION

Jakob Keulers, Hilden, Germany; vested in the
Alien Property Custodian

Application filed April 18, 1939

The screw connection of hollow rods to form a hollow rod string in deep well drilling, especially with rotary rods, using a special connecting piece is known. This connection consists as shown in Fig. 1 of the accompanying drawing of two connection parts 1 and 2 which, with internal screw threads 3 and 4, are screwed on to the external screw threaded ends of the hollow rods 5 and 6. This screwing is effected for fixing the parts 1 and 2 on the ends of the hollow rods 5 and 6, it being usually not absolutely essential to unscrew these connections. When using the hollow rods in the bore hole, it is, however, very often necessary to unscrew and reconnect the individual hollow rods. This is effected by unscrewing the screw connection 7 between the parts 1 and 2. This screw thread connection is a steep conical thread with coarse thread profile, so that the screwing can be carried out very easily and quickly. The screw thread 7 is not very sensitive to wear and damage. The screw connections 3 and 4, however, are fine threads and consequently can seldom be unscrewed without damaging, especially when the hollow rods are to be used several times for drilling.

When using this hollow rod connection, it has, however, been found that the spigot ends of the hollow rods 5 and 6 frequently strip in the screw threads of the parts 1 and 2. This tearing off is attributed to the following reasons:

Owing to the continuous strong vibration of the rod string during the drilling operation the screw threaded ends of the parts 1 and 2 widen slightly. The result of this is, that the connecting parts 1 and 2 screw further on to the ends of the rods 5 and 6. By the additional stresses thereby produced, favoured by the notch effect of the pointed screw threads 3 and 4, fracture very often occurs in the screw threaded portion of the hollow rods 5 and 6.

The cause of this fracture may, however, consist in many instances solely in the notch effect of the fine threaded pointed thread profile, especially as the durability of the material is very greatly reduced by the corrosion in the windings of the screw thread which are not in engagement. The danger of corrosion is very great owing to the aggressive flushing medium which continually flows along the outer surface of the hollow rod during the boring operation. At the same time, not only the outer surface is attacked by corrosion but a not inconsiderable amount of wear is caused by the continuous action of the flushing current as the flushing medium causes eddy effects within the recesses of the connection parts

1 and 2. The resultant reduction of the thickness of the hollow rod wall reduces the strength of the connection to a considerable extent.

It has been repeatedly endeavoured to avoid these rod fractures by modifying the screw connection, as in deep drilling the rod fractures are an extremely disagreeable phenomenon, which frequently occasions very high expense and not unfrequently results even in the loss of the bore hole.

Thus, for example it has been endeavoured to avoid the overscrewing of the connections by welding the end faces of the connection parts 1 and 2 to the rods 5 and 6. Rod fractures are not, however, prevented by this procedure as the notch effect of the sharp screw thread is always present. Moreover, the welding results in unfavourable changes of structure occurring at and beyond the edges of the weld, and under the constant stress to which the string of hollow rods is subjected to a high degree, notch effects are produced which cause permanent fractures.

It was believed that another solution for the prevention of stripping had been found in the hot shrinking of the connection parts 1 and 2 on the ends of the rods 5 and 6. However, this measure has not been effective as, in spite of the parts being shrunk on, they worked loose during the drilling and moreover the other inconveniences above described remain.

The object of the invention is, to overcome all these objections of the hollow rod connection and to prevent the stripping of the rod ends.

According to Fig. 2 a shoulder 8 is provided in the thickened end 5 of the hollow rod against which a ring 9 bears. The ring 9 may be fixed on the end 5 of the rod for example by hot shrinking. The end face of the ring 9 serves as bearing surface for the connection part 1, the contacting surfaces coming to bear the one against the other when the connection part 1 is screwed tightly on to the rod end 5. Thus, overscrewing of the connection part 1 on the end 5 of the rod is prevented even when the string of rods is used repeatedly in the bore hole. The end face of ring 9 may be either perpendicular or inclined to the axis of the hollow rod and profiled.

Furthermore, by the connection part 1 bearing tightly against the end face of ring 9 the flushing medium is prevented from coming into contact with the screw thread so that the objectional effects resulting therefrom are eliminated.

To do away with the danger of fracture due to the notch effect of the pointed screw thread in general use to-day, the screw thread is given a

more suitable profile, in that it is constructed for example as a flat, trapezoidal or round thread.

The screw connection is packed by two tapered surfaces 10 provided one on the outer side of the hollow rod and the other on the inner surface of the connection piece. When the two parts are screwed home these surfaces bear so tightly the one against the other that a tight joint is ensured even under maximum pressures.

It has been found advantageous, to make the end of the rod 5 elastic to enable it to yield dur-

ing the screwing operation. This is effected by a groove 11, which forms on the end face of the hollow rod a lip 12 which is elastic and yieldable without the whole end face of the hollow rod yielding. To effect a yet more intimate connection between the end 5 of the hollow rod and the connection 1 these two parts can be shrunk while they are being screwed together, in that the connection part 1 is heated to a suitable temperature before being fitted on the end 5 of the hollow rod.

JAKOB KEULERS.