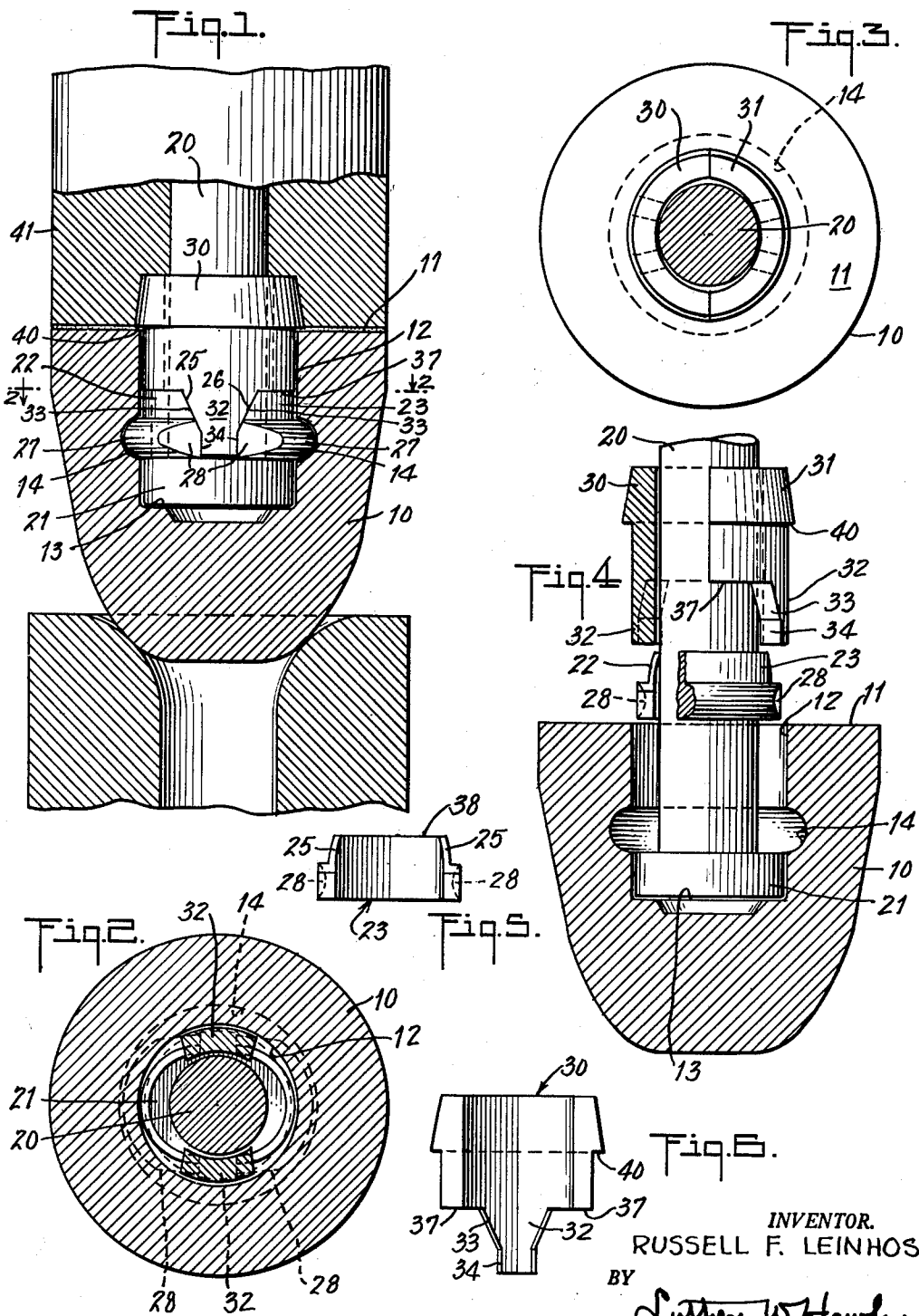


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R. F. LEINHOS
STOPPER ROD ASSEMBLIES

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STOPPER ROD ASSEMBLIES

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1 Claim. (Cl. 22—85)

This invention relates to stoppers and stopper rod assemblies.

In the steel industry, the increased steel tonnages require a longer pouring time and higher pouring temperatures and have given rise to a real problem in stopper rod assemblies.

In some stopper rod assemblies a bolt is inserted through a bore in the bottom of the stopper, the bore being plugged after the rod is in place and the bolt affixed to the rod. The increased pouring temperature and increased tonnages cause accelerated erosion at the bottom or nose portion of the stopper, particularly in the case of stoppers having plugged bottoms.

This invention has for its salient object to provide a solid nose stopper, thus minimizing erosion and thermo-shock cracks, and means for fastening it to the assembly.

Another object of the invention is to provide a lock for locking a stopper rod to a stopper in such a manner that the rod cannot be loosened or removed from the stopper by twisting one of the parts relatively to the other.

Another object of the invention is to provide a stopper rod assembly so constructed and arranged that the rod and stopper can be easily and quickly assembled.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which

FIG. 1 is a vertical sectional elevation of a stopper rod assembly in which the stopper rod is secured or anchored in the stopper;

FIG. 2 is a transverse sectional elevation taken substantially on line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a transverse sectional elevation of the stopper and a top plan view of the spreaders or anchoring sections which spread the anchoring sleeves to secure the stopper rod in the stopper;

FIG. 4 is an elevational view, partly in section, showing the parts in separated position before assembly;

FIG. 5 is an elevation of one of the anchoring sections; and

FIG. 6 is an elevation of one of the spreader sections.

In the particular embodiment of the invention illustrated in the drawings, there is shown a stopper 10 having a solid bottom and a flat upper surface 11. The stopper has a downwardly extending, substantially cylindrical recess 12 which extends downwardly thereinto from the flat upper surface 11. The bottom of the recess 12 is substantially flat, as shown at 13. The wall of the recess 12 has an annular groove or indentation 14 spaced upwardly from the bottom of the recess.

A stopper rod 20 has a flange 21 on the bottom thereof and the rod and flange are adapted to be inserted in the recess 12, as shown in FIG. 1.

A pair of anchoring sleeves 22 and 23 are adapted to fit around the rod 12 and when moved inwardly can be inserted in the recess 12 in the manner shown in FIG. 4. These sleeves are tapered or inclined at their ends, as shown at 25 and 26, and have an outwardly extending projection or protuberance 27 which is adapted to enter and fit within the annular groove or indentation 14 when

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the sleeves are expanded in the manner hereinafter described. The end surfaces of the portions 27 are flattened or slabbed off, as shown at 28.

In order to expand the sleeves or anchoring sections 23, a pair of sections 30 and 31 are mounted on and encircle the rod 20 and are dimensioned to fit within the recess 12 when the sections are assembled on the rod in the manner shown in FIG. 4. The sections, as shown are semi-cylindrical.

The lower ends of the sections 30 and 31 are provided intermediate their ends with downwardly extending spreader portions 32 having tapered walls 33 and parallel walls 34. The tapered portions 25 and 26 of the spreader portions terminate in a flat shoulder 37 which is adapted to rest upon the upper ends 38 of the anchoring members 23.

The sections 30 and 31 are flanged at their upper ends, as shown at 40, and after they are inserted in the recess 12 and have spread the anchoring members, the flanges 40 are disposed above but do not rest upon the flat upper surface 11 of the stopper 10.

A sleeve 41 is mounted on the rod 12 above the stopper and rests upon the upper end portions of the sections 30 and 31 in the manner shown in FIG. 1 and on the stopper.

From the foregoing description it will be evident that firm and secure anchoring means is provided for anchoring the stopper rod to the stopper and that the parts can be easily and quickly assembled to secure the rod and stopper together.

Although one specific embodiment of the invention has been particularly shown and described it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claim.

What I claim is:

In a stopper rod assembly, a solid stopper having a flat upper surface, said stopper having a substantially cylindrical axial recess extending downwardly thereinto from said upper surface, said recess having an annular indentation adjacent the lower end of the recess, a stopper rod having a bottom flange seated in the bottom of the recess, a pair of semi-cylindrical locking sections having a maximum dimension less than the cross section of the stopper recess, said sections having laterally projecting portions arranged to extend into the annular indentation in the recess wall, said locking sections extending upwardly for only a portion of the depth of the recess and having spaced-apart tapering edges, and a pair of expansion sleeve members dimensioned to fit around the stopper rod and within the recess, said sections having flanges at their upper ends disposed above the flat upper surface of the stopper and being dimensioned to extend downwardly and to rest on the upper surface of the locking sections within the recess, said sleeve members having tapered projections extending downwardly between and engaging the tapering edges of the locking sections to spread the locking sections and thereby to extend the laterally projecting portions into the annular indentation in the recess wall of the stopper whereby said locking sections are locked to the stopper.

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