Feb. 21, 1956 W. D. GOODMAN 2,735,703

PIVOTED ROD JOINT

Filed July 21, 1951

Fig. 1

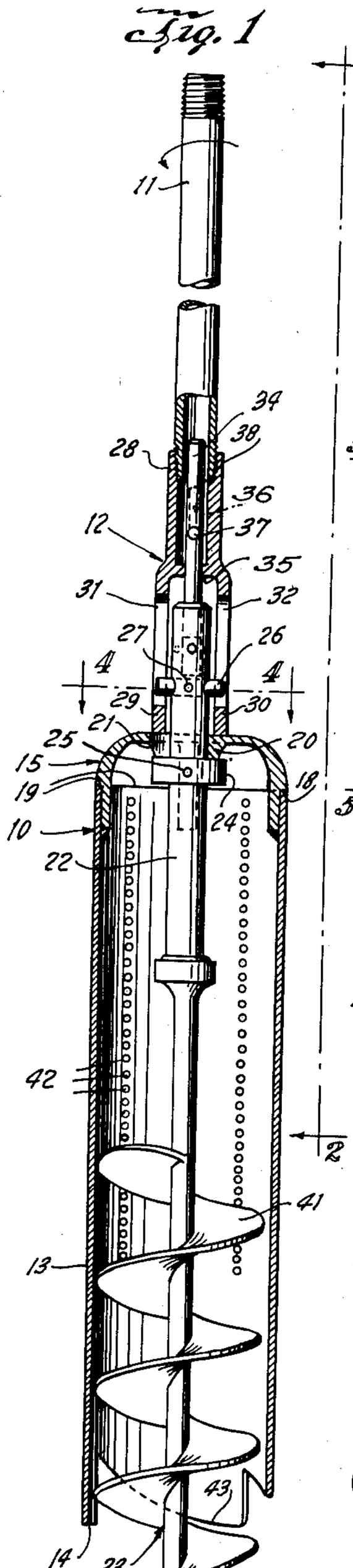

Fig. 2

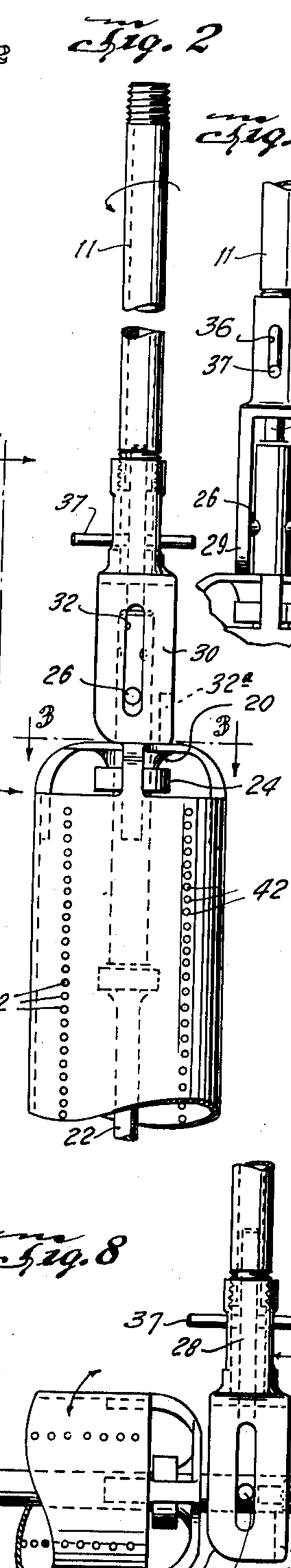

Fig. 5

Fig. 3

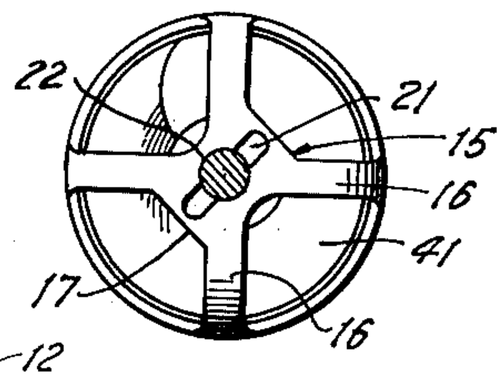

Fig. 4

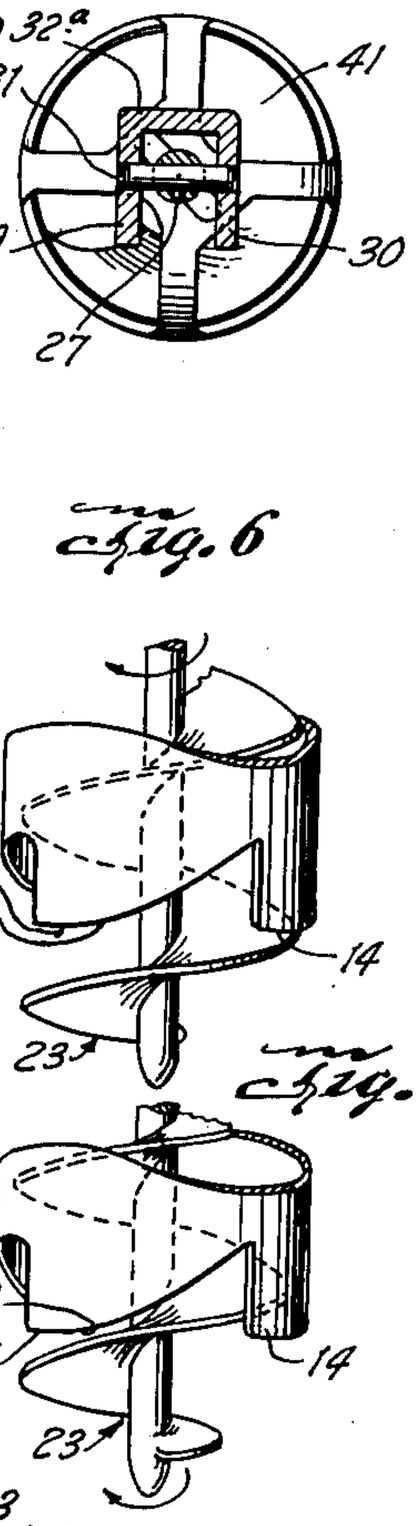

Fig. 6

Fig. 7

Fig. 8

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PIVOTED ROD JOINT

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5 Claims. (Cl. 287—99)

This invention relates to well tools and more particularly to an extractor for removing gravel, sand and the like from wells.

In drilling water wells, it is customary to sink well casing in the hole made by a drilling auger as soon as water is struck. It is then necessary to extract gravel and sand from inside the lower portion of the casing. An extractor must therefore be provided which can be passed down through the casing to the lower portion of the casing to gather the gravel, sand and other loose foreign material at the bottom of the well. The extractor may also be employed to clean out old wells in which debris has accumulated over a period of time. The extractor should preferably be provided with a connector assembly by means of which it may be easily attached to and detached from the lower end of a stringer pipe by means of which it is lowered into a well and by means of which it is rotated while in the well. In addition, the extractor should be provided with means adjacent its lower end which will seize and hold pieces of debris or foreign matter which are too large to be carried into the extractor.

Accordingly, it is an object of this invention to provide a new and improved extractor for use in wells.

It is another object of the invention to provide a new and improved extractor for removing gravel, sand or the like from wells.

It is still another object of the invention to provide a new and improved extractor provided with means at its lower end for seizing and holding large pieces of debris.

It is a further object of the invention to provide a new and improved connector assembly.

It is a still further object of this invention to provide a new and improved connector assembly for detachably connecting a well tool to a stringer pipe or rod.

It is another object of the invention to provide a new and improved connector assembly for detachably but non-rotatably connecting two members to one another.

Briefly stated, the new and improved extractor for removing gravel, sand and the like from wells includes a shell or barrel in which is rotatably mounted an auger. The bottom edge of the barrel is serrated and the edge of each serration has a portion which has the same upwardly spiralled shape as the outer edge of the screw or thread of the auger in order that as the outer edge of the screw approaches this portion of the serration, large objects may be clamped therebetween and thus carried to the surface with the extractor. The upper end of the shank of the auger is provided with a transverse pin which extends through slots in opposite sides of the lower portion of a connector sleeve. The lower portion of the connector sleeve has an open side to permit the shank to be pivoted about the pin to a position in which the shank is perpendicular to the connector sleeve. Rotation of the shank while it is in this position will remove the pin from the slots since it is shorter in length than the slots. The upper end of the shank is provided with a bore which receives the lower end of a lock plunger

reciprocably mounted in the upper end of the connector sleeve. The lock plunger prevents pivotal movement of the auger with respect to the cylinder sleeve when its lower end is telescoped in the bore in the upper end of the shank.

For a better understanding of the invention, reference may be had to the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing,

Figure 1 is a longitudinal partly sectional view of the extractor showing it connected to a stringer pipe by the connector assembly;

Figure 2 is a side elevational view taken on the line 2—2 of Figure 1;

Figure 3 is a sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a side view taken on the line 5—5 of Figure 2;

Figure 6 is a fragmentary side elevation of the auger and barrel showing the auger in one position relative to the serrations in the bottom edge of the barrel;

Figure 7 is a fragmentary side elevation of the auger and barrel of Figure 6 showing the auger rotated to another position relative to the serrations; and,

Figure 8 is a fragmentary side elevation showing the auger and barrel of the extractor pivoted to a position at right angle to the connector sleeve.

Referring now to the drawing, the preferred embodiment of the invention there illustrated comprises an extractor 10 connected to a stringer pipe 11 by a connector assembly 12. The extractor includes a shell or barrel 13 whose bottom edge is provided with serrations 14. The upper end of the barrel 13 is partly closed by a bracket 15 having four straps 16 which extend radially outwardly from a central substantially horizontal portion 17 and then curve downwardly to telescope into the upper end of the barrel. Each strap 16 is reduced at its lower end to form a downwardly facing ledge or shoulder 18 which abuts the upper edge of the barrel. The lower ends of the straps may be secured to the barrel by welding or in any other conventional manner.

The central portion 17 of the bracket 15 has a downwardly facing boss 20 provided with an elongated aperture 21 which is enlarged at its center to receive the shank 22 of the auger 23. Upward movement of the shank 22 relative to the barrel 13 is limited by a collar 24 secured to the shank by a set screw 25. The elongated slot 21 in the central portion 17 is provided to allow the pin 26 extending transversely through a suitable aperture in the shank 22 adjacent its upper end to pass through the central portion 17 and thus allow the auger to be removed from the barrel. The transverse pin 26 is secured in place by a set screw 27.

The connector assembly 12 comprises a connector sleeve 28 whose lower end has a pair of parallel depending members 29 and 30 provided with elongated vertical slots 31 and 32, respectively. The opposite ends of the transverse pin 26 extend into the slots 31 and 32. A wall 32*a* connects the depending members 29 and 30 at their edges forming in effect a three-sided bracket.

The upper end of the shank 22 has a longitudinal bore or recess 33 into which extends the lower end of a lock plunger 34 which is vertically slidable in the connector sleeve 28 and through the reduced portion of the bore of the connector sleeve formed by an annular flange 35 which is employed to help center the lock plunger. The connector sleeve is provided with registering elongated vertical slots 36, one of which can be seen in Figure 5. The opposite ends of a pin 37 secured to the lock plunger

in any suitable manner extend outwardly through the slots **36** and serves to limit vertical longitudinal movement of the lock plunger with respect to the connector sleeve.

The upper end of the connector sleeve **28** has an enlarged bore to provide an annular shoulder or ledge **38**. The enlarged bore is provided with threads to engage the lower threaded end of the stringer pipe **11**. The ledge **38** limits the distance the stringer pipe may be screwed into the connector sleeve.

In operation, the excavator **10** is assembled by inserting the auger **23** into the barrel **13** and passing the upper end of the shank **22** through the enlarged portion of the slot **21** of the bracket **15**. The shank **22** is rotated until the transverse pin **26** on the shank is aligned with the slot **21** so that further movement of the auger into the barrel will cause the pin **26** to pass through the slot. The shank **22** is then secured to the depending members by holding the excavator in a position perpendicular to the dependent members **29** and **30** with the transverse pin **26** in a vertical position. The excavator is then moved toward the connector sleeve so that the end of the shank will extend between the dependent members **29** and **30** and above the wall **32***a*. The shank **22** is then rotated to cause the transverse pin **26** to move into the slots **31** and **32** in the dependent members. The relative positions of the various elements will then be as illustrated in Figure 8. The extractor **10** is then allowed to pivot in a counter-clockwise manner (Fig. 8) to a vertical position. The corners of the dependent members **29** and **30** opposite the connecting wall **32***a* are rounded off, as at **40**, so that the central portion **17** of the bracket **15** will be firmly held between the lower ends of the dependent members and the collar **24** on the shank **22**. The lock plunger **34**, which up to this intsant has been held in its uppermost position, is allowed to descend and its lower end enters the bore **33** in the upper end of the shank **22** to prevent pivotal movement of the extractor relative to the connector assembly **12**.

If it is desired to detach the excavator from the connector assembly, the above sequence of operation is reversed. The lock plunger **34** is first moved upwardly, the excavator is pivoted upwardly until it reaches the position shown in Figure 8, the shank **22** is rotated to move the ends of the transverse pin **26** from the slots **31** and **32** in the dependent members **29** and **30**, and the excavator is then moved to the left to remove the shank **22** from between the dependent members.

In use excavator **10** is lowered into the casing of a well which is to be cleaned by means of the stringer pipe **11** until the excavator reaches the bottom of the well. The stringer pipe is then rotated in the direction indicated by the arrows in the drawing by hand or any suitable conventional machinery. Since the bottom edge of the stringer pipe abuts the ledge **38** in the connector sleeve, the sleeve is forced to rotate with the stringer pipe. The edges of the slots will bear against the ends of the transverse pin **26** of the auger **23** and the auger also will be forced to rotate with the stringer pipe. The barrel **13**, due to frictional forces, will also tend to rotate but its rotary movement will soon cease as the serrations **14** dig into the gravel or sand at the bottom of the well. The auger **13** will then continue to rotate forcing up gravel and sand into the barrel **13** by its helical screw **41** until the barrel **13** is filled and some of the load of gravel and sand will come into contact with the bracket **15**. The frictional forces between the auger and the barrel will increase to the point where the barrel again begins to rotate with the auger. The resulting increase in the force necessary to rotate the stringer pipe is easily detachable and indicates that the excavator is full. The stringer pipe is pulled up to the surface in any conventional manner. Any water in the barrel will escape through the apertures **42** provided in the barrel.

When the loaded excavator **10** is brought above the surface of the earth or the working platform, it is unloaded and again sent down to pick up a load. This process is repeated until the well is dug to a desired level.

In many cases rocks or pieces of foreign matter found at the bottom of the well are so large that they cannot be carried into the barrel **13**. Such large objects may be seized or held between the serrations **14** and the screw **41** of the auger. In order to facilitate this seizing of large objects, at least one portion, as at **43**, of the lower edge of each serration **14** has the same curve as the outer edge of the screw so that the vertical spacing between the screw and this portion **43** of the lower edge of a serration will decrease as the auger rotates relative to the barrel **13**. Figure 6 shows a large vertical gap or spacing and Figure 7 shows how the gap may be decreased by rotating the auger. It will be evident therefore that any portion of a large object disposed between the screw **41** and the portion **43** will be clamped therebetween if the object is so large it cannot be carried up into the barrel. The large object can then be removed from the hole by raising the excavator above the surface.

It will be evident now that an excavator **10** for removing gravel, sand and like materials from wells has been illustrated and described which is easily and quickly attachable to a stringer rod by means of a connector assembly **12**. It will be further seen that the serrations **14** and the screw **41** of the auger **23** are so formed that large objects may be clamped therebetween to be carried from the well to the surface by the raising of the excavator.

It will be apparent to those skilled in the art that various changes and modifications may be made in the illustrated invention without departing from the invention and it is intended, therefore, in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A connector for detachably securing a driving member to a driven member, the latter having an axially bored elongate shank and a transverse pin extending therethrough below the bore thereof, said connector comprising: a sleeve having a pair of diametrically opposed elongate slots therein, an end member on said sleeve having an open side and matching elongate slots in opposite walls thereof, said elongate shank being receivable in said end member between said opposing walls with the ends of said transverse pin extending into the slots of said walls, said shank being pivotable about said transverse pin to a position perpendicular to said sleeve, a plunger reciprocable in said sleeve and receivable in the bore of said shank for rigidly securing said sleeve in axial alignment with said shank, and means carried by said plunger and operable in the slots of said sleeve for actuating said plunger.

2. A connector for detachably securing a driving member to a driven member having an elongate shank provided with an axial bore in one end and a transverse pin, said connector comprising a sleeve joined at one end to said driving member and having diametrical slots therein, a member of substantially square cross-section formed on the other end of said sleeve having an open side for the reception of the end of said shank, said latter member having matched slots in opposite walls thereof for receiving the transverse pin of said shank about which said shank is rotatable to dispose said shank axially with said sleeve, a plunger movable axially in said sleeve and receivable at one end in the bore of said shank to hold said sleeve and shank in axially aligned relationship and means carried by said plunger and extending through the slots of said sleeve for actuating said plunger.

3. A connector for joining a driving member to a driven member having a shank having a transverse pin adjacent one end thereof and an axial bore in said end, said connector comprising a sleeve having diametrically

opposed slots therein, a member formed on an end of said sleeve having opposed walls provided with registering slots and between which walls the end of said shank is receivable at right angles to said sleeve for rotation to engage said transverse pin with said registering slots to define in said pin a pivot about which said shank is rotatable into axial alignment with said sleeve, means reciprocable in said sleeve and receivable in the bore in the end of said shank to hold said shank and sleeve in axial alignment and means carried by said reciprocable means and disposed in the slots of said sleeve for actuating said reciprocable means.

4. A connector for securing a driving member to a driven member having an elongate shank provided with a transverse member adjacent one end, said connector comprising a sleeve, a member carried by the lower end of said sleeve and having opposed walls, provided with longitudinal registering slots, and a connecting wall between said opposed walls, said shank end being receivable between said walls at right angles thereto and pivotable to align said transverse member with said slots for reception thereby and received therein, said transverse member defining a pivot about which said shank

is pivotable into axial alignment with said sleeve, and means for locking said shank and sleeve in axially aligned relationship.

5. The structure of claim 4, said locking means comprising a plunger reciprocable longitudinally in said sleeve and insertable into a bore in the end of said shank in aligned positions of said shank and sleeve and a transverse member carried by said plunger and extended through said sleeve for actuating said plunger.

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