

No. 622,308.

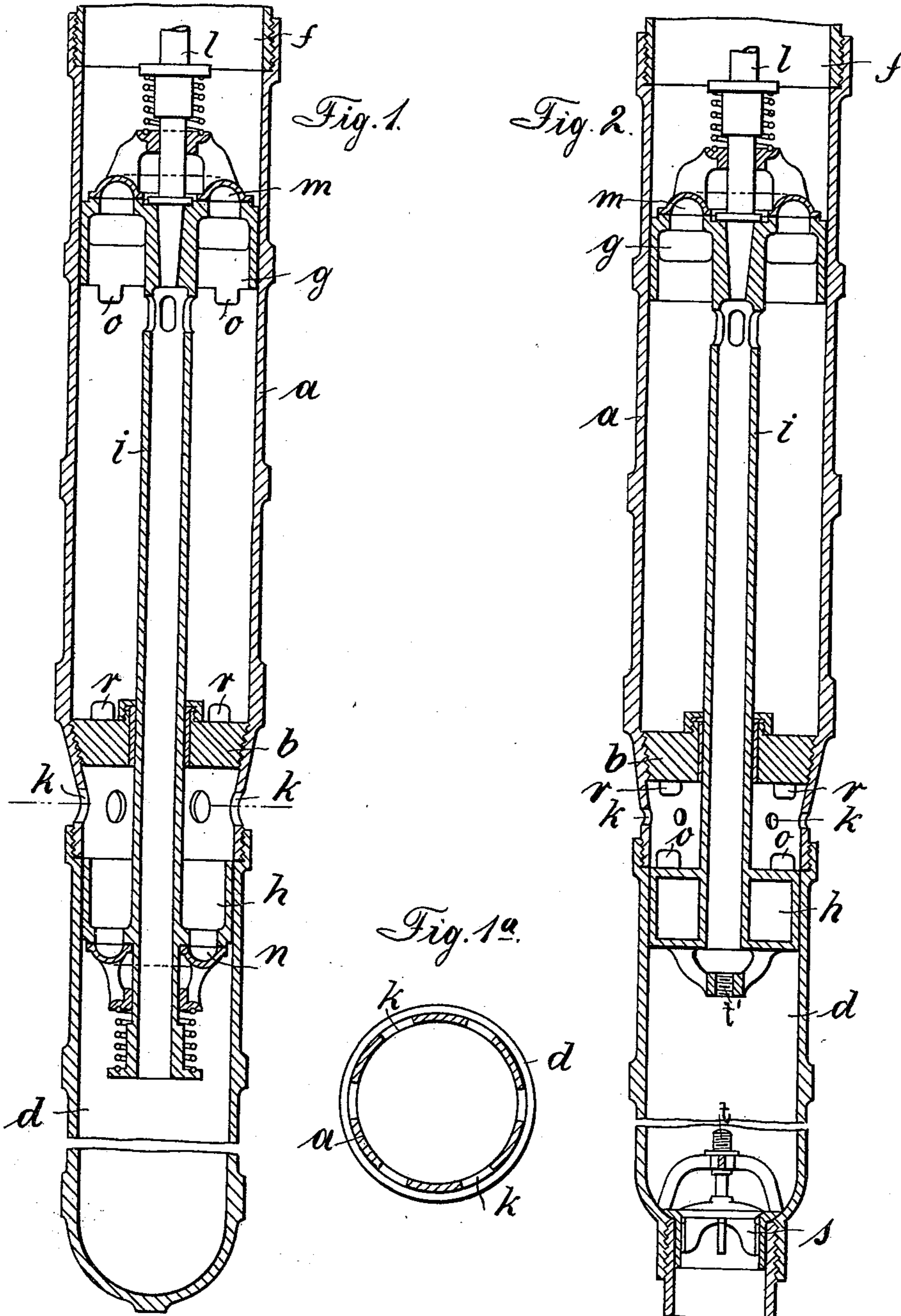
Patented Apr. 4, 1899.

H. WINKEL.
PUMP.

(Application filed Dec. 21, 1897.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:
Fred White
Thomas F. Wallace

INVENTOR:
Heinrich Winkel.
By his Attorneys
Arthur T. Parker & Co.

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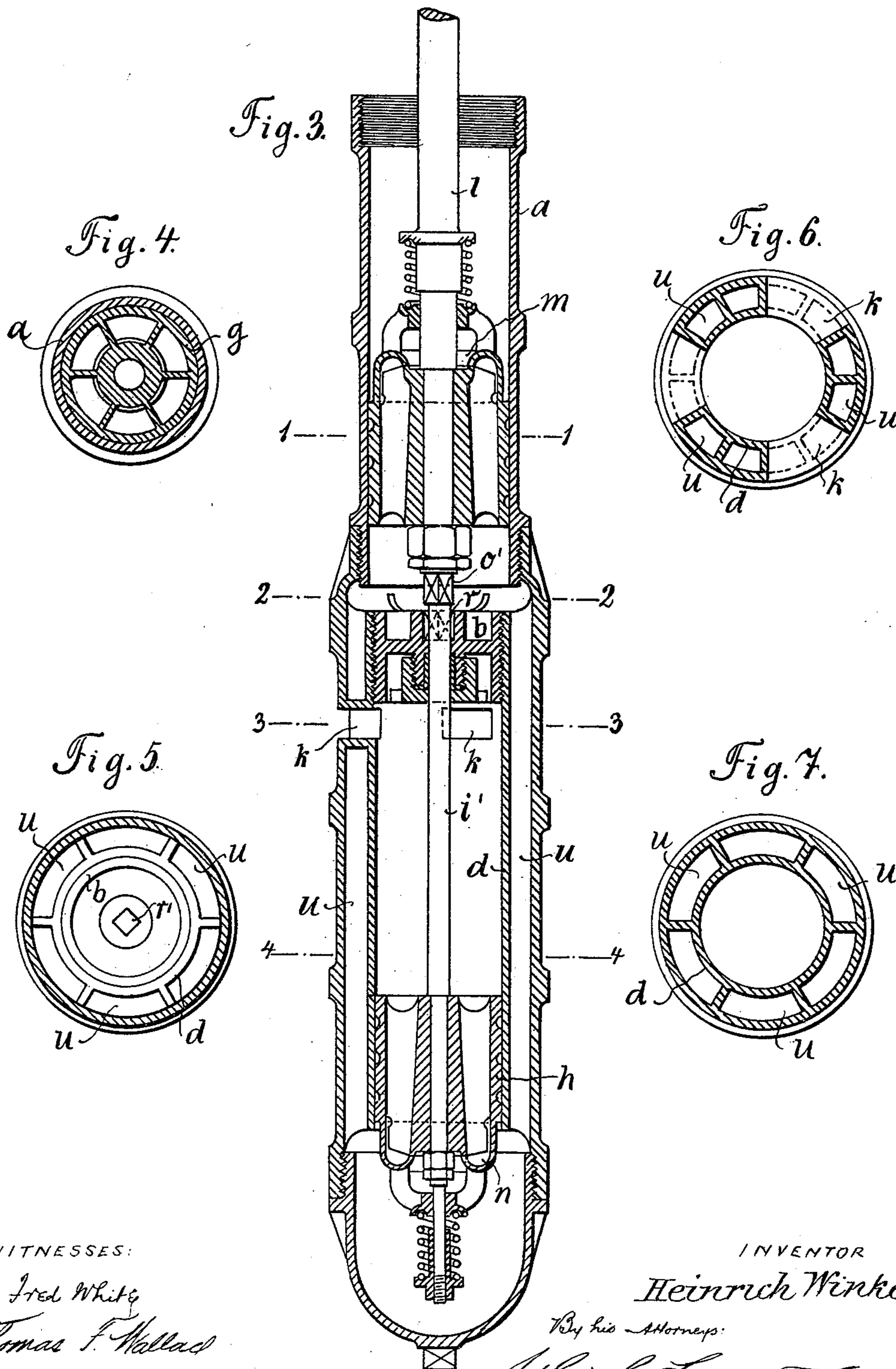
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WITNESSES:

Ired White
Thomas F. Hallas

INVENTOR

Heinrich Winkel

By his Attorneys:

Allen C. Parker & Co

No. 622,308.

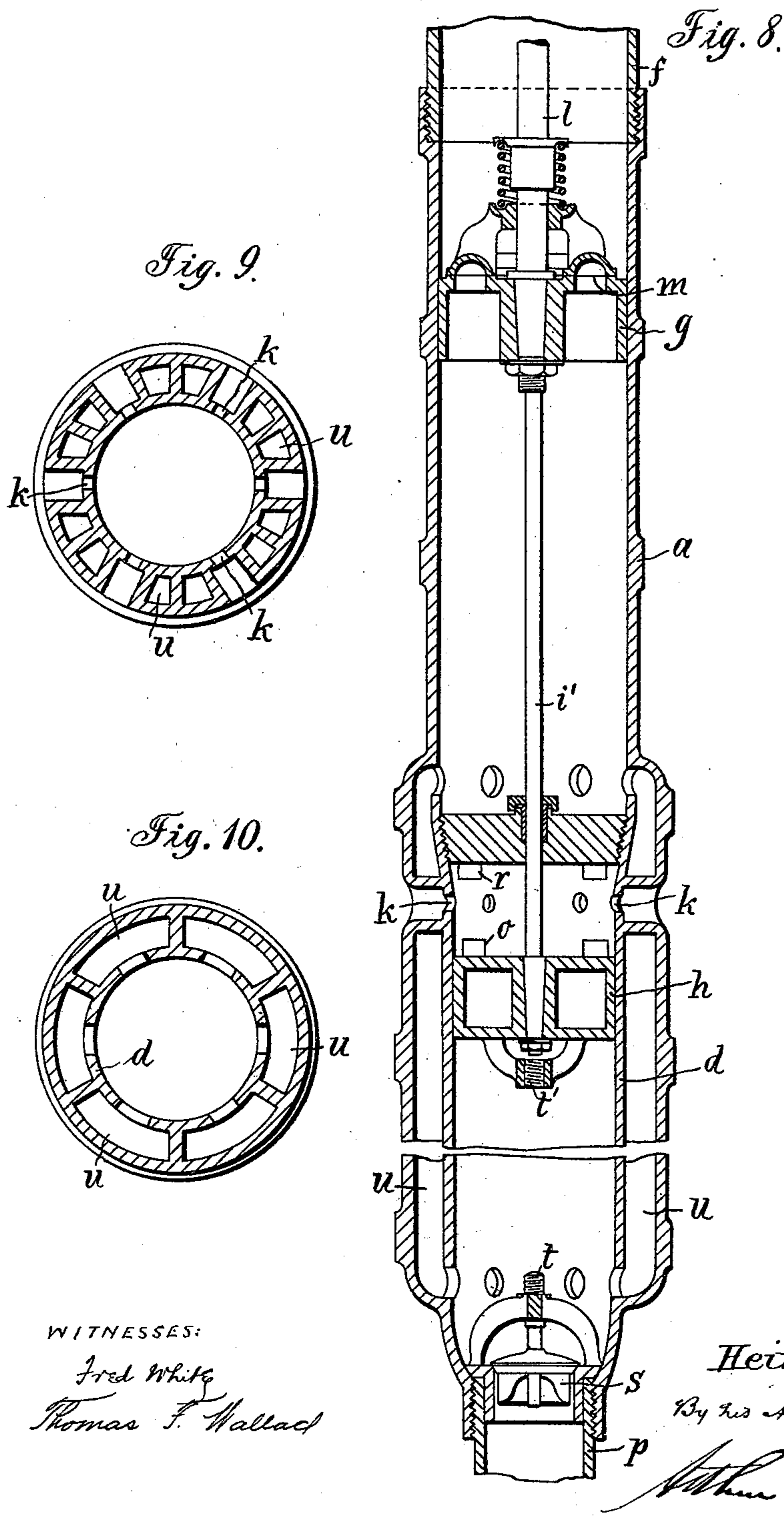
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3 Sheets—Sheet 3.



WITNESSES:

Fred White
Thomas F. Wallad

INVENTOR:

Heinrich Winkel.

By his Attorneys:

Arthur C. Frasier & Co.

UNITED STATES PATENT OFFICE.

HEINRICH WINKEL, OF MOSCOW, RUSSIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 622,308, dated April 4, 1899.

Application filed December 21, 1897. Serial No. 662,855. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH WINKEL, of Moscow, Russia, have invented certain new and useful Improvements in Pumps, (for which Letters Patent have been obtained in Germany, No. 93,127, dated April 29, 1896; in Austria, No. 47/2,227, dated June 12, 1897; in Hungary, No. 8,655, dated February 5, 1897; in Belgium, No. 126,162, dated February 5, 1897; in France, No. 263,758, dated February 5, 1897; in Great Britain, No. 3,122, dated February 5, 1897, and in Russia, No. 794, dated November 28, 1896;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Pumps according to this invention are primarily designed for use as Artesian-well pumps and pit-pumps and are characterized by the fact that a double delivering action is produced by means of two coaxial pistons placed on a single rod. Each piston works in its respective cylinder, and the rod connecting the two pistons extends through a fixed partition-wall which closes the lower end of the upper pump-cylinder. The lower piston delivers during its downward stroke, and the connection with the upper part of the pump is effected either by means of a hollow rod connecting the two pistons or by means of passages which surround the lower pump-cylinder. The lower pump-piston may be constructed either as a valve-piston or as a disk piston, a suction-pipe with suction-valve being in the latter case connected to the pump-cylinder.

Figure 1 of the accompanying drawings illustrates in longitudinal section an arrangement of pump according to this invention specially adapted for use as an Artesian-well pump. In this case the upper pump-cylinder *a* is closed at its bottom by a partition-wall *b*, below which the lower pump-cylinder *d* is arranged. The upper pump-cylinder *a* is connected directly with the delivery-pipe *f*. The upper pump-piston *g* is connected with the lower pump-piston *h* by means of a pipe *i*, which opens at its lower end into the lower

pump-cylinder *d*, (which is closed at the bottom,) and is provided below the upper piston *g* with holes, as shown. Both the pistons *g* and *h* are constructed as valve-pistons; but the valves *m* of the upper piston open upward, whereas those, *n*, of the lower piston open downward. In order to deliver, the pump must dip into the liquid to be pumped to such extent that the holes *k*, provided in the upper end of the lower cylinder *d*, will be immersed. When both pistons are moved downward by means of the pump-rod *l*, the valves *n* of the lower piston *h* close, and the liquid in the cylinder *d* is forced through the connecting-pipe *i* and the open valves *m* of the upper piston into the delivery-pipe *f*. Thus the lower part of the pump acts as a force-pump. In the upward movement of the two pistons *g* and *h* the valves *m* of the upper piston close, and the upper part of the pump works with a forcing action, while liquid flows through the open valves *n* of the lower piston *h* and the apertures *k* of the lower cylinder *d* into the cylinder *d* and passes into the upper cylinder through the connecting-pipe *i*. To enable the two pistons to be removed from the pump, the partition-wall *b* is detachable, being preferably screw-threaded, so that it can be unscrewed. This is effected by means of projections *o* on the lower surface of the upper piston *g*, to which correspond projections *r* on the upper surface of the partition *b*, the arrangement being such that when the two pistons are in their lowest position the partition-wall *b* can be unscrewed by turning the pump-rod *l* and both pistons lifted out, together with the partition-wall, by means of the said pump-rod. In a similar manner after all the parts have been inserted into the pump-cylinders the partition-wall *b* can be screwed in again by means of the upper piston *g*.

Fig. 2 is a longitudinal section illustrating a modified construction in which the lower piston *h* is formed as a disk piston, and to the lower pump-cylinder *d* there is attached a suction-pipe *p*, provided with a suction-valve *s*. The openings *k* in the upper part of the lower pump-cylinder *d* serve in this case simply for the inlet of air. In this modification the upper side of the disk piston *h* is provided with projections *o* for the purpose of

enabling the partition-wall *b* to be unscrewed by means of projections *r* on the under surface of the same. The valve-seat of the suction-valve *s* is provided with an upper bridge-piece having a screw-pin *t*, adapted to fit an internally-screw-threaded part *t'*, carried by the under surface of the lower piston *h*, so that the valve-seat of the suction-valve *s* can, when required, be taken out also by means of the lower piston *h*.

Fig. 3 shows in longitudinal section a modification of the pump first hereinbefore described, and Figs. 4 to 7 are sections according to the lines 1 1, 2 2, 3 3, and 4 4 of Fig. 3. In this case the connection of the two pistons *g* and *h* is effected by means of a solid rod *i'*. The lower pump-cylinder *d* is surrounded by a number of passages *u*, by means of which the lower part of this pump-cylinder *d*, which is closed at the bottom, is connected with the lower part of the upper pump-cylinder *a*. The partition-wall *b* is in this case unscrewed by means of a piece *o'* of square cross-section, which is provided on the rod *i'* and which fits into a corresponding recess *r* in the wall *b*.

Figs. 8 to 10, inclusive, show another construction of pump according to this invention, consisting of a modification of the pump shown in Fig. 2. In this arrangement the lower part of the lower pump-cylinder *d* is connected by passages *u*, surrounding the latter, with the lower part of the upper pump-cylinder, and the two pistons *g* and *h* are connected by a solid rod *i'*. This construction will be clear without further description.

The last two modifications have the advantage over the ones first described that in conserving a cylindrical outer form and a concentric position of all parts of the pump the dimensions and proportions can be so selected that the upstroke and the downstroke of the pistons will move forward equal quantities of liquid.

The two pumps shown in Figs. 1 and 2, have, however, the advantage that when they are employed as Artesian-well pumps or tube-

well pumps they allow of making use of the greatest possible free area of the wall.

I claim as my invention the following-defined novel features substantially as hereinbefore specified, namely:

1. A double-acting pump comprising two coaxial cylinders *a* and *d*, and a fixed partition *b* separating them, combined with pistons *g* and *h* working in said respective cylinders, a piston-rod connected to both pistons for operating them simultaneously, an inlet-valve admitting fluid to the lower cylinder beneath its piston, an outlet-valve carried by the upper piston, a fluid-passage communicating from beneath the lower piston to the upper cylinder beneath the upper piston, and said partition *b* fitted detachably to said cylinders, with coacting shoulders carried by the pistons and formed on said partition respectively by means of which the partition can be displaced and be removed with the pistons.

2. A double-acting pump comprising two coaxial cylinders *a* and *d*, and a fixed partition *b* separating them, said partition screw-threaded engaging a threaded socket between said cylinders, and having projections *r r*, combined with pistons *g* and *h* working in said respective cylinders, a piston-rod connected to both pistons for operating them simultaneously, an inlet-valve admitting fluid to the lower cylinder beneath its piston, an outlet-valve carried by the upper piston, a fluid-passage communicating from beneath the lower piston to the upper cylinder beneath the upper piston, and projections *o o* on one of said pistons adapted to engage said projections *r r* to unscrew the partition *b*.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HEINRICH WINKEL.

Witnesses:

H. MENGEL,
P. KRAUDER.