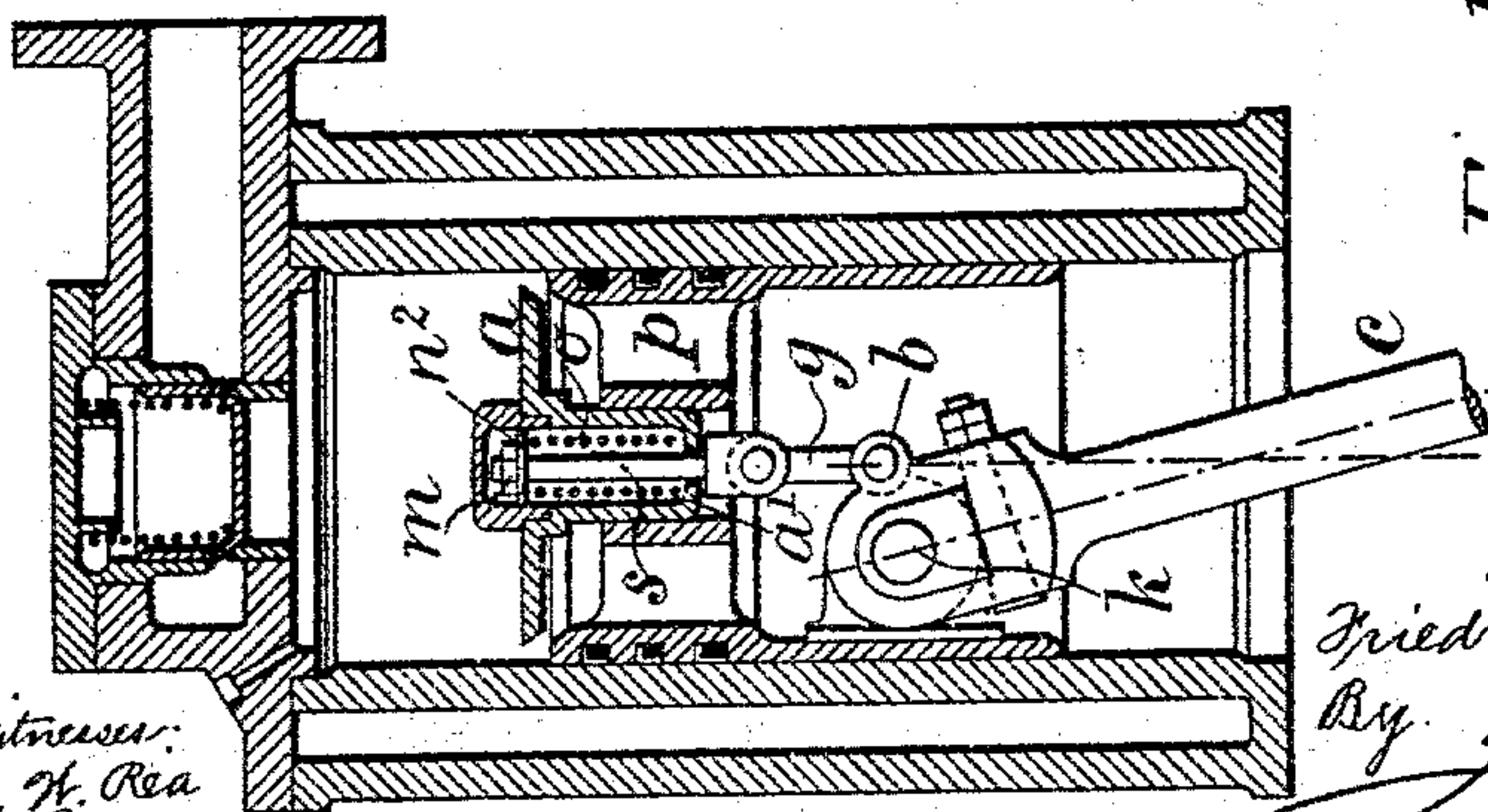
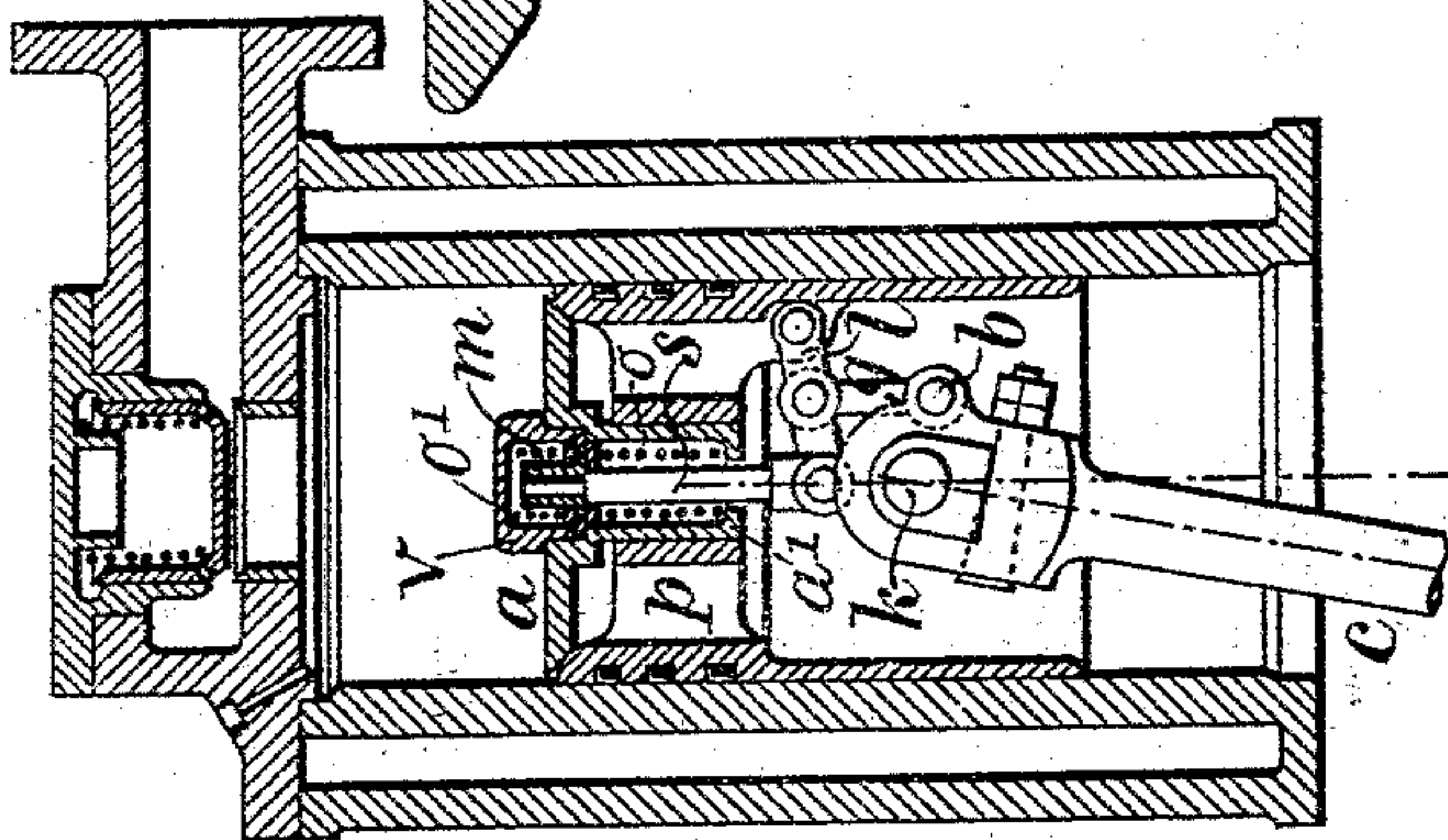
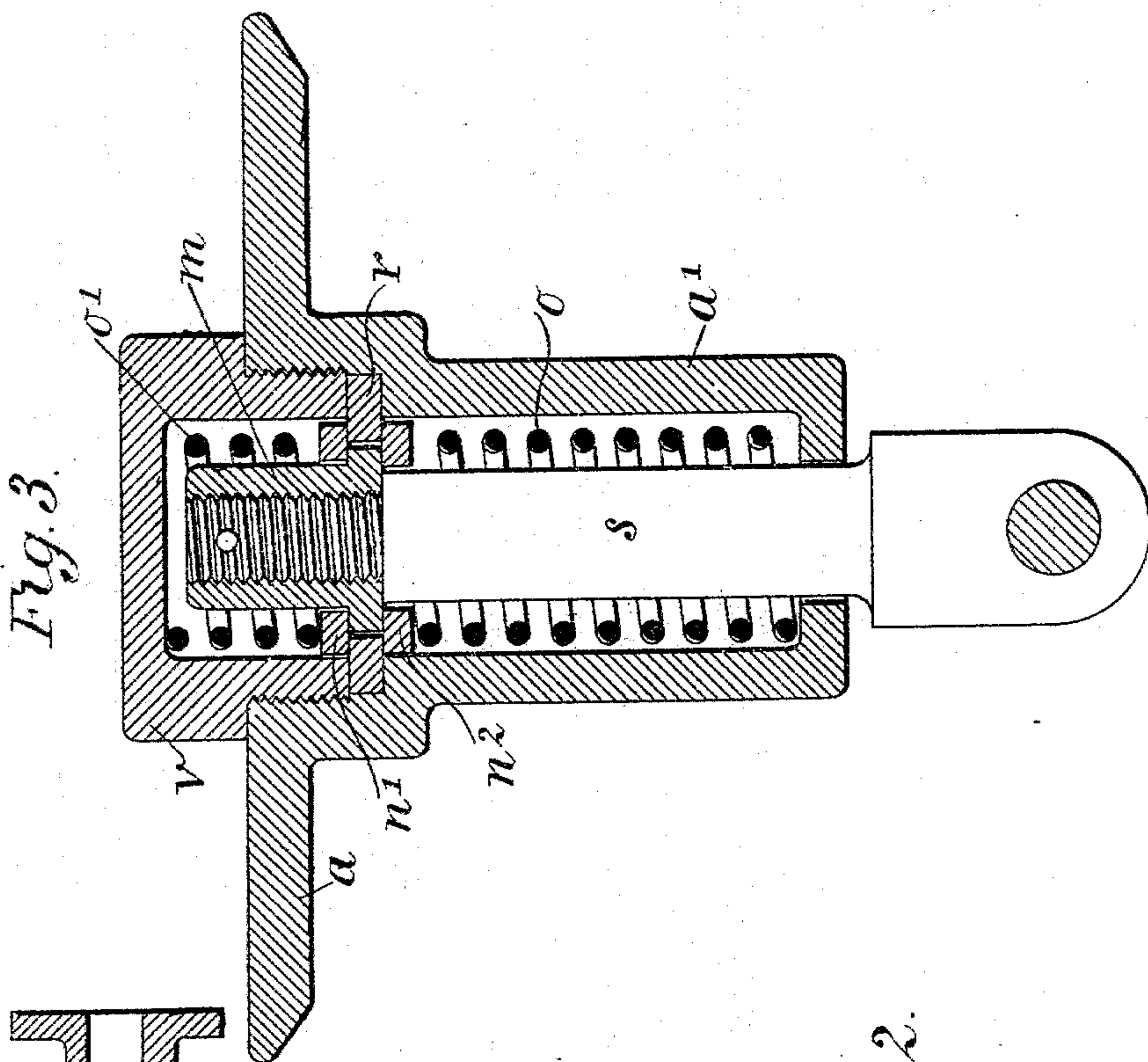


(No Model.)

F. NEUKIRCH.
SUCTION VALVE FOR AIR COMPRESSORS.

No. 511,248.

Patented Dec. 19, 1893.



Witnesses:
S. H. Rea
J. A. Schell

Inventor:
Friedrich Neukirch

By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

FRIEDRICH NEUKIRCH, OF BREMEN, GERMANY.

SUCTION-VALVE FOR AIR-COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 511,248, dated December 19, 1893.

Application filed August 12, 1893. Serial No. 482,975. (No model.) Patented in Italy February 7, 1893, LXV, 371.

To all whom it may concern:

Be it known that I, FRIEDRICH NEUKIRCH, a subject of the Emperor of Germany, residing at Börse Zimmer, No. 19, Bremen, Germany, have invented a new and useful Improved Suction-Valve Device for Single-Acting Air-Compressing Cylinders, (for which Letters Patent have been obtained in Italy, dated February 7, 1893, LXV, 371,) of which the following is a specification.

For every air compressing machine, it is of importance, first, that the air shall enter the compressing cylinder as freely as possible; secondly, that the suction valve shall close at the proper moment, and, thirdly, that the suction valve shall also open at the proper moment, namely at the point when the air under pressure remaining in the dead space of the cylinder is expanded to such an extent as not to be appreciably above the pressure of the atmosphere.

The present invention has for its object to fulfill these conditions. I will proceed to describe the same with reference to the accompanying drawings in which—

Figure 1 shows a vertical section of a single acting compressing cylinder with my invention applied thereto. Fig. 2 shows a similar section with a slightly modified construction and Fig. 3 shows an enlarged section of the suction valve and parts in connection therewith.

In order to obtain a large area of opening for the admission valve *a* this is placed on a passage formed through the piston *p* to a pin *k* on which is directly pivoted the crank connecting-rod *c*. To the side of the connecting rod-head is attached one end of a link *g*, pivoted to a pin *b*, the other end of which link is connected either directly to the valve stem *s* as at Fig. 1 or as at Fig. 2 to an intermediate point of a lever *l* one end of which is pivoted to the piston *p* while the other end is pivoted to the stem *s*. The upper end of this stem carries a screw nut *m*, against a rim on which bears a washer *n*² that is pressed upon by one end of a helical spring *o* whose other end bears against the bottom of a socket *a'* of the valve through which the stem *s* passes. In the arrangement at Figs. 2 and 3 a ring *r* is secured in the socket by a screw cap *v*, in which is contained a second helical spring *o'*

the lower end of which bears against another washer *n'* that rests on the upper side of the ring *r*, and also upon the flange of the nut *m*. The before mentioned washer *n*² is also made to bear against the under side of the ring *r* by the spring *o* when the parts are in the position shown at Fig. 3.

If the upper surface of the valve *a* is subject to a greater air pressure than the pressure exerted by the spring *o'* which will be the case when it is at the end of the upstroke, such excess of pressure will prevent any upward pressure exerted by the angular motion of the connecting rod and link *g* upon the valve stem *s* from opening the valve, the resulting upward motion of the stem *s* being made to effect the compression of the spring *o'*. When the piston has moved downward slightly from the upper end stroke, the pressure above it will be reduced by the expansion of the air contained in the dead space, whereupon the valve *a* will be forced open, as soon as the pressure of the spring *o'* is sufficiently in excess of the air pressure for this purpose.

In the lowest position of the piston the suction valve will be closed by the angular motion of the connecting rod and link *g*, and it will be held closed during the upstroke. After the valve is closed, and during the upstroke, the stem *s* will be moved still farther downward by the angular motion of the connecting rod, and in pressing upon the ring *n*² with the nut *m*, it will compress the spring *o* more or less, causing this to press the valve *a* tightly down upon its seat. When arrived at the end of the upstroke, the angular motion of the connecting rod and link *g* will tend to open the valve *a* but this will be prevented by the excess of pressure of the compressed air above the piston, until on the commencement of the downstroke, the pressure of the spring *o'* is sufficient to overcome the diminished air pressure, as before explained.

In the arrangement shown at Fig. 1 the upper spring *o'* being omitted, the opening of the valve at the commencement of the downstroke will only take place when the air above the piston has, by expansion, had its pressure reduced below that of the atmosphere.

Having thus described the nature of this

invention and the best means I know for carrying the same into practical effect, I claim—

1. In a single acting air compressing cylinder, the combination, with the piston, of a suction valve *a* whose stem *s* is connected by a link *g* either directly or indirectly with a pin *b* on the connecting rod head situated to one side of the pivot pin *k* thereof so that the angular motion of the connecting rod in one direction tends to open the said valve, while the angular motion in the other direction tends to close the valve, substantially as described.

2. In a single acting air compressing cylinder, the combination with the piston of a suction valve *a* whose stem *s* is connected therewith through a spring or springs and is

connected by a link *g* either directly or indirectly with a pin *b* on the connecting rod head to one side of the pivot pin thereof, so that the opening of the suction valve will be effected as soon as the pressure of the compressed air above the piston is sufficiently reduced by expansion to be overcome by the pressure of the said spring connection, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of July, A. D. 1893.

FRIEDRICH NEUKIRCH.

Witnesses:

HEINRICH J. BEHRENS,

HERM. PIECHOTTA.