

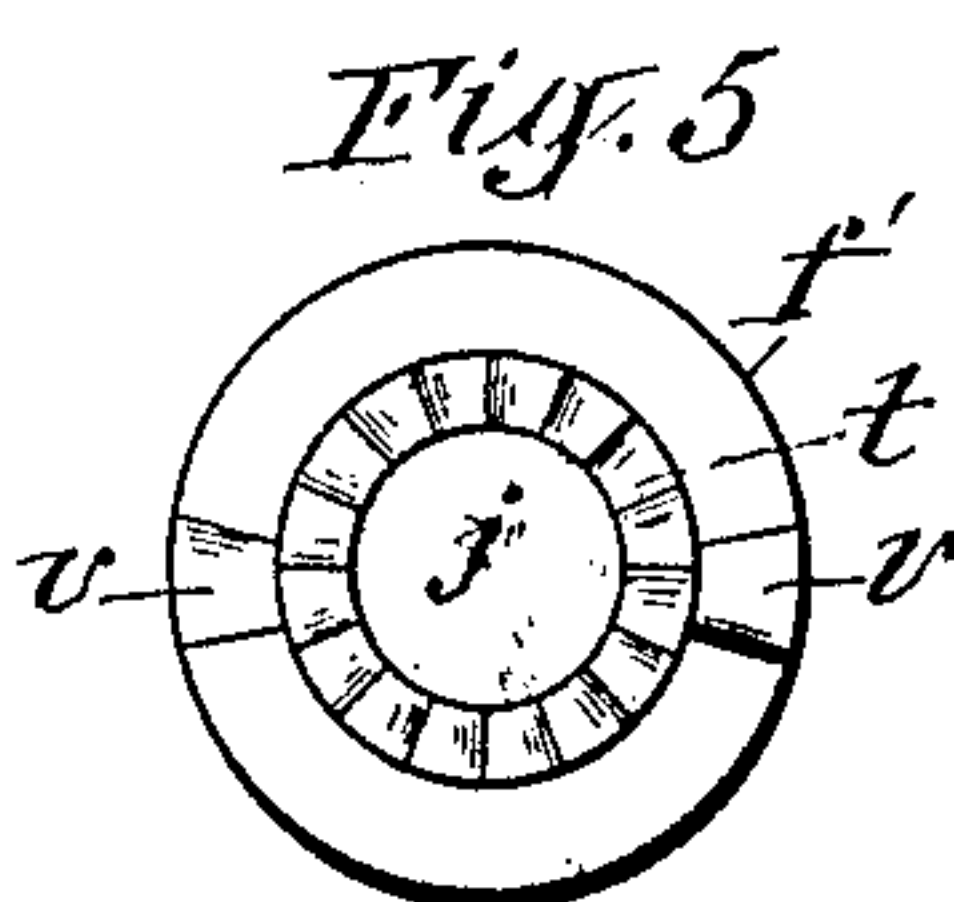
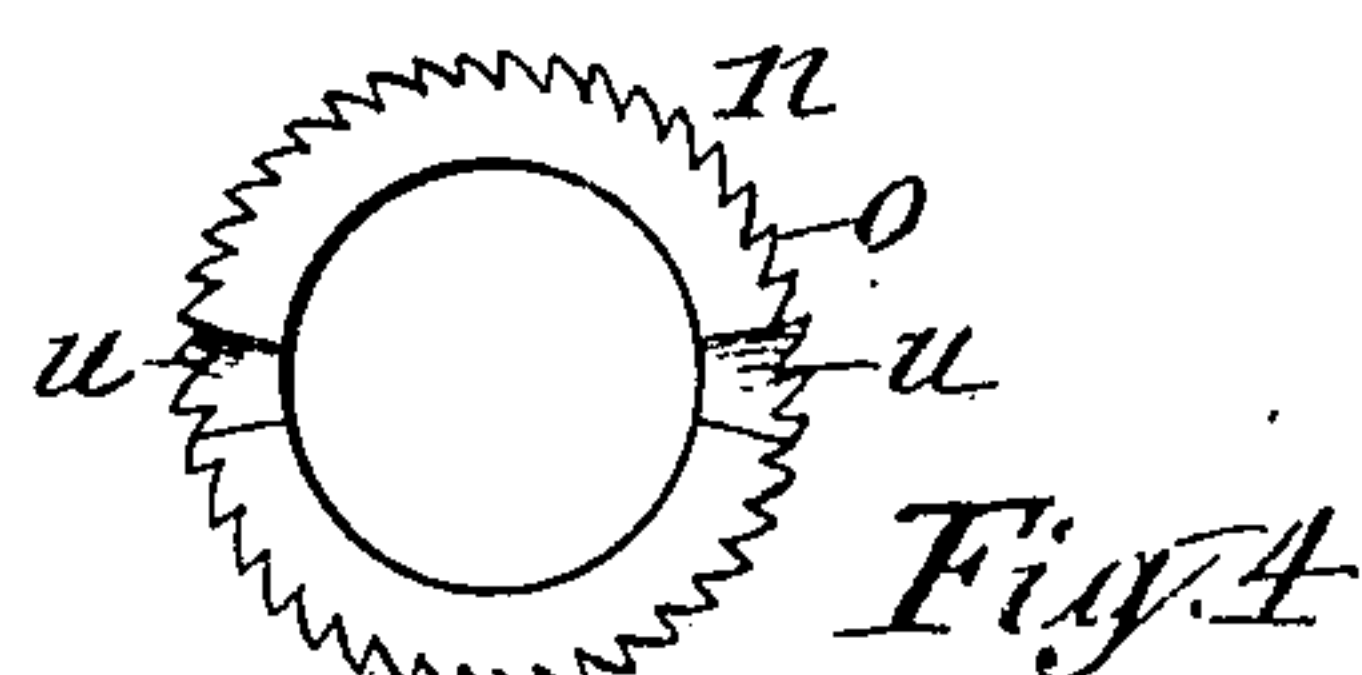
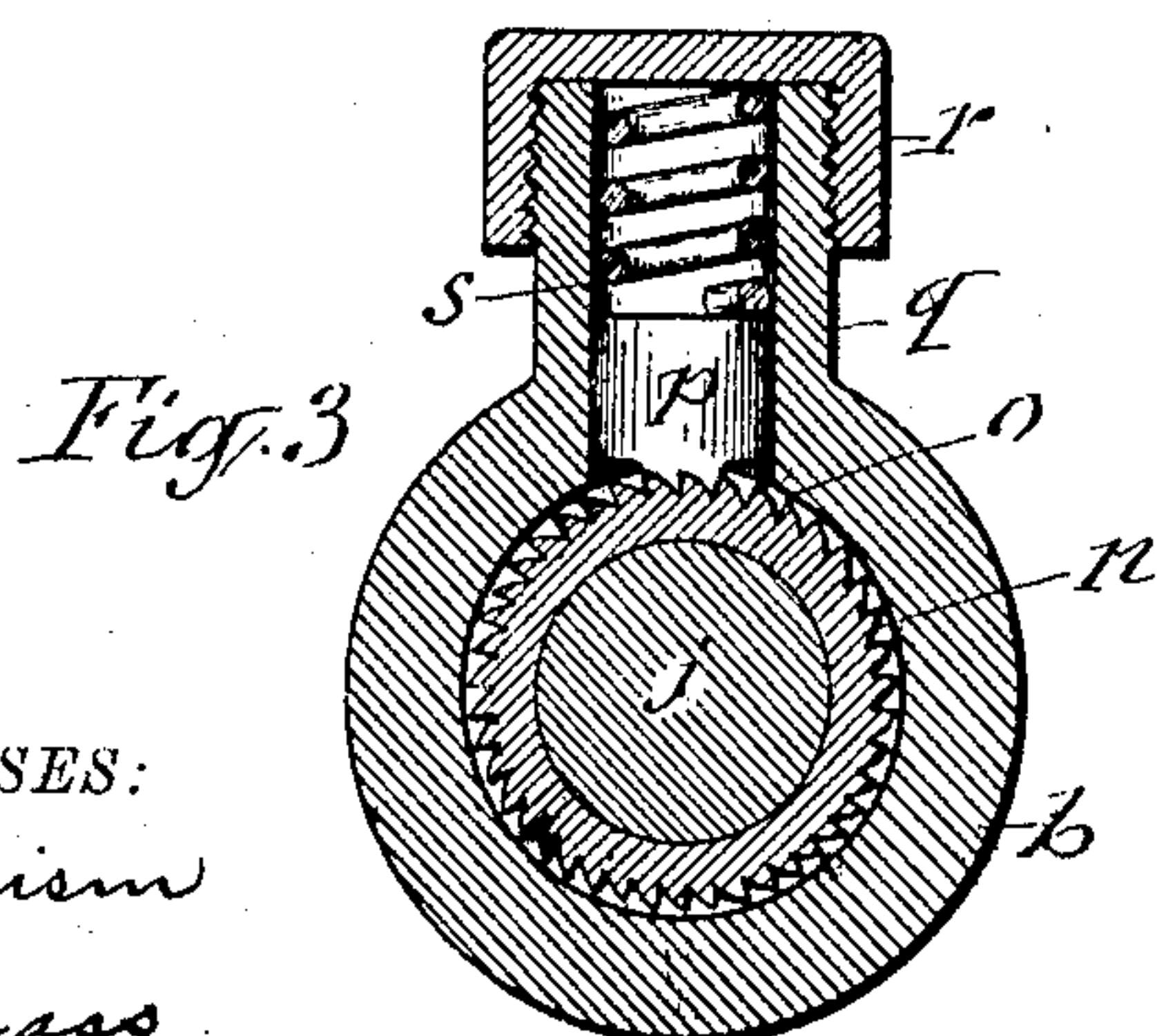
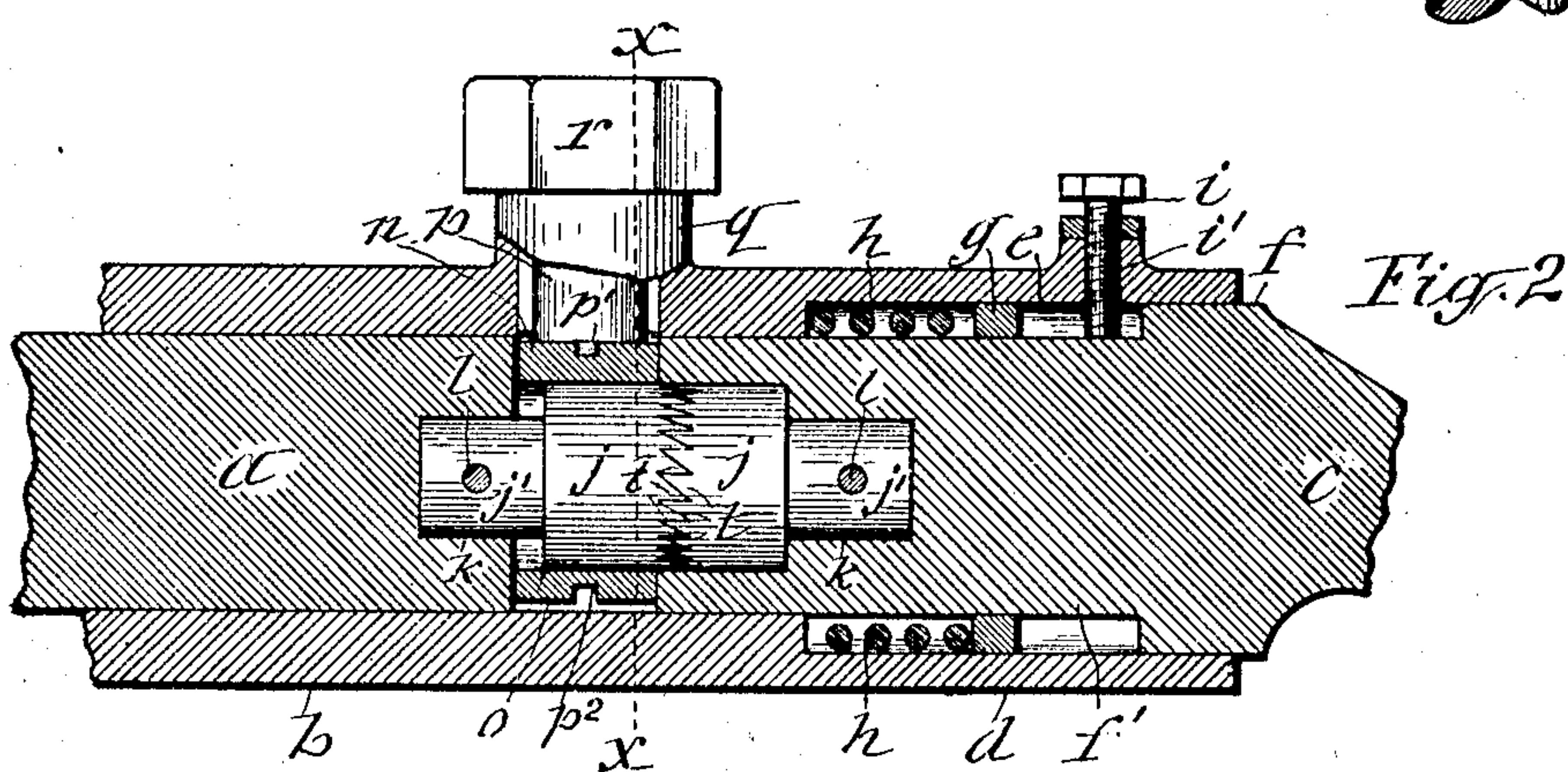
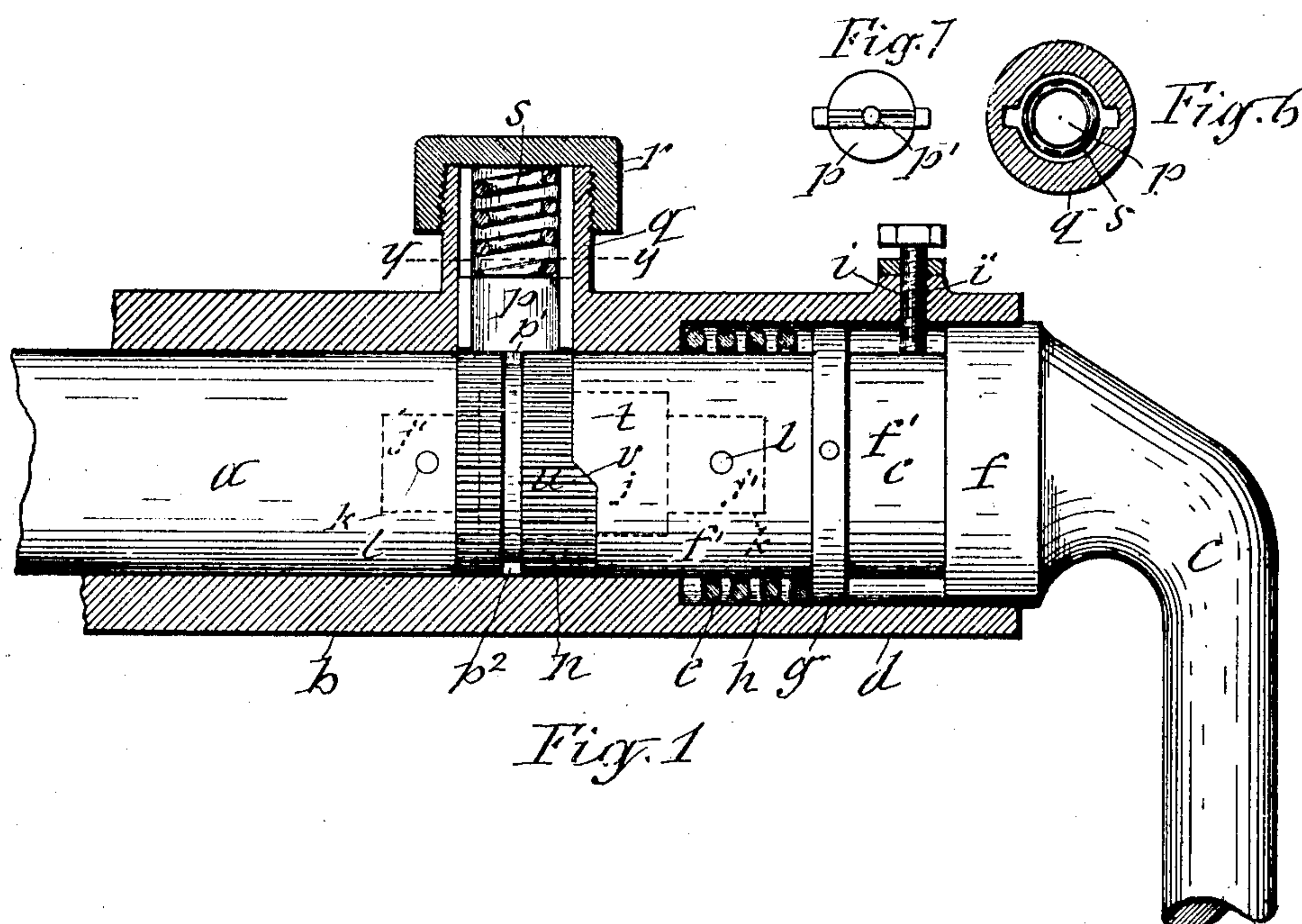
No. 888,221.

PATENTED MAY 19, 1908.

C. P. CARY.

SAFETY STARTING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED JULY 17, 1907.



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SAFETY STARTING DEVICE FOR EXPLOSIVE-ENGINES.

No. 888,221.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed July 17, 1907. Serial No. 384,152.

To all whom it may concern:

Be it known that I, CHARLES P. CARY, a citizen of the United States, and resident of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Safety Starting Devices for Explosive-Engines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to manually operated cranks required on internal combustion motors for the purpose of starting the rotation of the engine-shaft to compress the explosive charge and effect the initial explosion necessary to start the engine. It is a well known fact that in said operation of starting the engine the initial explosion is sometimes effected prematurely, which causes a back action of the engine-shaft and a correspondingly back thrust of the hand-crank. Such action is liable to injure the person operating the crank.

The object of this invention is to provide simple, inexpensive, compact and safe means for guarding against the said liability of injuring the person operating the starting-crank. And to that end the invention consists in the improved construction and combination of the component parts of the attachment of the starting crank hereinafter described.

In the accompanying drawings, Figure 1 is a side view of an end portion of the engine-shaft and the attaching end of the starting crank with the axial support thereof shown in longitudinal section: Fig. 2 is a longitudinal section of the attaching end portions of the aforesaid shaft and crank: Fig. 3 is a transverse section on the line—X—X— in Fig. 2: Fig. 4 is a detached face view of the cam-ring: Fig. 5 is a face view of the inner end of the crank: Fig. 6 is a transverse section on the line—Y—Y— in Fig. 1: And Fig. 7 is a detached plan view of the dog which detains the cam-ring.

—a— denotes the engine-shaft which is usually a crank-shaft operated by the pistons of the engine as is well known by persons familiar with the operation of explosive-engines.

—b— represents the axial support or journal-box of said shaft. Said support may be part of the frame of the engine.

—c— represents the attaching end of the starting-crank which is supported axially in line with the shaft —a— and movable longitudinally toward and from the end of said shaft. To safely support the said crank as aforesaid I prefer to form the axial support —b— with a longitudinal extension —d—, in which the starting crank is journaled. To limit the longitudinal movement of said crank so as to retain it supported in the extension —d—, I form the interior of said extension with a circumferential rabbet —e— extending the greater portion of the length of the extension —d— and out through the end thereof. The attaching end —c— of the starting-crank is formed with a head —f— which is journaled in the outer end-portion of the rabbet —e—. A shank —f¹— extends from the head —f— beyond the inner end of the rabbet —e— and is of the same diameter as the interior of the axial support —b— in which the inner end of the shank —f¹— is journaled. At a suitable distance from the head —f— is a collar —g— pinned onto the shank —f¹— or otherwise rigidly attached thereto.

The inner end-portion of the rabbet —e— is occupied by a spiral-spring —h— which presses on the inner side of the collar —g— to push the crank from the end of the shaft —a—. In the part of the rabbet between the collar —g— and head —f— is a suitable stop to limit the outward movement of the crank. To allow the attaching end —c— of the crank to be inserted or to be withdrawn from its support —d— when desired. I form the aforesaid stop of a removable screw —i— passing through a threaded aperture —i¹— in the wall of the rabbeted part of the support —d— and into the rabbet.

To the adjacent ends of the shaft —a— and crank —c— are rigidly secured cooperating-clutch-members preferably consisting of cylindrical heads —j—j— of smaller diameter than the interior of the axial support —b— and formed with beveled engaging teeth —t— and with studs —j¹—j¹— which are rigidly secured in sockets —k— in the ends of the shaft and crank, preferably by means of pins —l— passing transversely through the shaft —a— and crank —c— and through the studs —j¹—j¹—.

The described construction of the attachment of the clutch-members to the shaft and

crank is simple and easily effected and renders the efficiency thereof safe and reliable.

—*n*— represents a ring which is interposed between the ends of the shaft —*a*— and crank —*c*—, and rotatable independently thereof. The outer periphery of the said ring is formed with a ratchet —*o*— which is engaged with the teeth of a dog —*p*— disposed in a tubular projection —*q*— projecting radially from the axial support —*b*— and having a cap —*r*— suitably secured to the end of the said projection. A spring —*s*— interposed between the cap —*r*— and outer end of the dog serves to hold said dog yieldingly in engagement with the ratchet —*o*—. The side of the ring —*n*— facing the end of the crank —*c*— is formed with outwardly inclined cams —*u*— which are adapted to engage correspondingly inclined bearings —*v*— formed on the adjacent end of the crank —*c*—. It will be observed that the starting crank —*c*— is held normally free or disengaged from the engine-shaft —*a*— by the action of the spring —*h*— and is retained in line with the said shaft by its support in the extension —*d*— of the axial support —*b*—. Said axial support and its extension form a housing which completely incloses all parts of the safety starting-devices employed between the shaft and crank and thus shield and protect said parts from dust and mud which would be liable to impair the efficiency and durability of said devices.

To start the engine the person in charge must first push the crank inward in its aforesaid support so as to cause the clutch-members —*j*—*j*— to interlock as shown in Fig. 2 of the drawings. Then by turning the crank —*c*— in a direction which causes the abrupt sides of the teeth —*t*—*t*— of the two clutch-members to engage each other, the engine-shaft receives rotary motion from the crank. In case the said shaft receives sudden reverse motion, incident to premature ignition of the explosive charge, the ring —*n*— is held stationary by the dog —*p*— engaging the ratchet —*o*— of said ring. This causes the crank —*c*— to be pushed outwardly by the inclined bearings —*v*— thereof sliding off from the cams —*u*— of the ring. Said movement throws the clutch-members —*j*—*j*— out of engagement and thus relieves the crank —*c*— from severe shock due to the reverse action of the engine-shaft.

The crank —*c*— can be removed from its axial support —*d*— by turning the screw —*i*— so as to cause it to move out of the rabbet —*e*— and thus allow the crank to be withdrawn from its axial support —*d*— when necessary for repairs or removal of either the collar —*g*— or spring —*h*—. In order to retain the ring —*n*— in its position in relation to the dog —*p*— while the crank —*c*— is removed as aforesaid, I form the exterior of said ring with a circumferential groove

—*p*²—, and provide the dog —*p*— with a pin or stud —*p*¹— which engages the groove —*p*²—.

What I claim as my invention is:—

1. The shaft and crank formed with sockets in their adjacent ends, cooperating clutch-members formed with studs rigidly secured in said sockets, the end of the crank formed with inclined bearings, a revoluble ring interposed between the crank and shaft and formed with cams disposed to engage the said inclined bearings, and a detent engaging said ring, in combination with the axial support formed with an extension jointly inclosing the aforesaid parts and provided with means for limiting the movements of the crank to and from the shaft.

2. The combination, with the engine-shaft, of the longitudinally movable starting crank formed with outwardly inclined bearings on its inner end, a ring interposed between the shaft and crank and provided with correspondingly inclined cams facing the end of the crank, the periphery of said ring being formed with a circumferential ratchet, the axial support of the shaft formed with a tubular radial projection and with an extension inclosing the aforesaid parts, a dog disposed in said radial projection and engaging the aforesaid ratchet, a spring pressing the dog toward said engagement, and cooperative clutch-members fastened to the adjacent ends of the shaft and crank as set forth.

3. The combination, with the engine-shaft, of its axial support formed with a longitudinal extension, the starting crank journaled in said extension and movable longitudinally and formed with outwardly inclined bearings on its inner end, a spring disposed to force the crank outwardly, a stop limiting the outward movement of the crank, cooperating clutch-members fastened to the adjacent ends of the shaft and crank, a ring interposed between the shaft and crank and formed with outwardly inclined cams disposed to engage the inclined bearings of the crank, a circumferential rack formed on the periphery of the ring and a detent engaging said ratchet as set forth.

4. The combination, with the engine-shaft, of its axial support formed with a longitudinal extension and with an internal circumferential rabbet in said extension, the starting crank formed with a head journaled in the outer end portion of said rabbet and formed with a shank of the same diameter as the interior of the aforesaid axial support and extending from the aforesaid head beyond the rabbet, a collar attached to said shank, a spring seated in the rabbet and bearing on the inner side of the collar, a stop disposed between the collar and head of the crank to limit the outward movement of the crank, cooperating clutch-members fastened to the adjacent ends of the shaft and crank, a rota-

table ring interposed between the said ends and formed with outwardly inclined cams facing the end of the crank, correspondingly inclined bearings on the inner end of the 5. crank, and means for holding the said ring stationary to push the crank out of engagement with the shaft by the engagement of the aforesaid cams and bearings.

10 5. The combination, with the engine-shaft, of its axial support formed with a longitudinal extension and with an internal circumferential rabbet in said extension, the starting crank formed with a head journaled in the outer end portion of said rabbet, and 15 with a shank of the same diameter as the interior of the aforesaid axial support and extending from the aforesaid head beyond the ratchet, a collar attached to said shank, a spring seated in the rabbet and bearing on 20 the inner side of the collar, a screw-threaded aperture extending radially through the wall of the rabbeted portion of the aforesaid longitudinal extension between the head and collar of the crank, a screw passing through 25 said aperture, cooperating clutch-members

attached to the adjacent ends of the shaft and crank, a rotatable ring interposed between the shaft and crank and formed with a ratchet on its periphery and with outwardly inclined cams on the side facing the crank, 30 correspondingly inclined bearings on the inner end of the crank, a pawl engaging said ratchet and a spring pressing said pawl into engagement all combined to operate as set forth. 35

6. The combination, with the engine-shaft, of a removable starting crank formed with outwardly inclined bearings on its inner end, a rotatable ring interposed between the shaft and crank and formed with correspondingly 40 inclined cams facing the end of the crank and provided with an external circumferential groove, cooperative clutch-members fixed to the ends of the shaft and crank, and a detent engaging the ring and provided with a stud 45 engaging the groove of said ring as set forth.

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Witnesses:

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