No. 607,440. Patented July 19, 1898.

E. KASELOWSKY.

AUTOMATIC STEERING DEVICE FOR TORPEDOES.

(Application filed Jan. 5, 1897.)

(No Model.) 3 Sheets—Sheet 1.

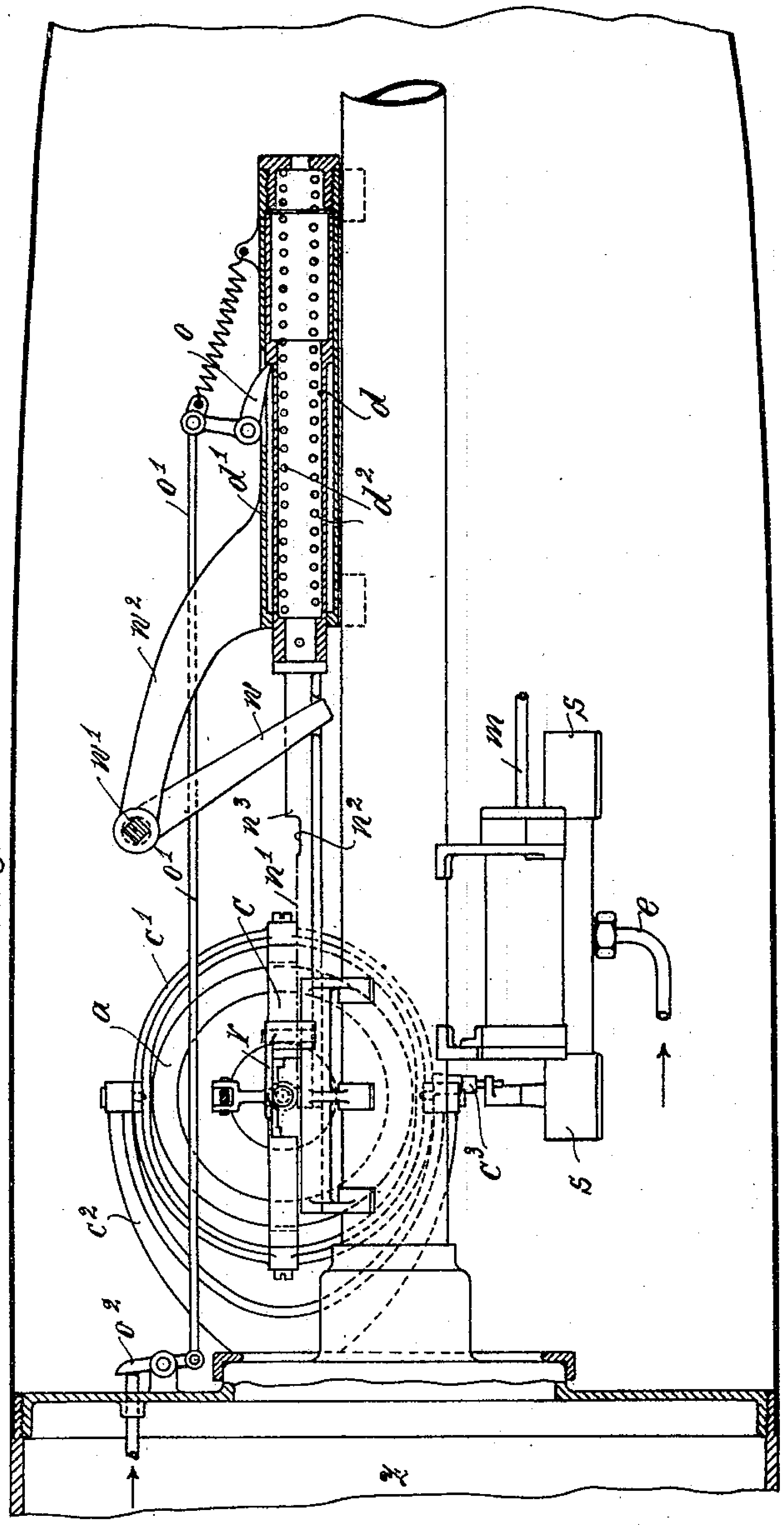

Fig. 1.

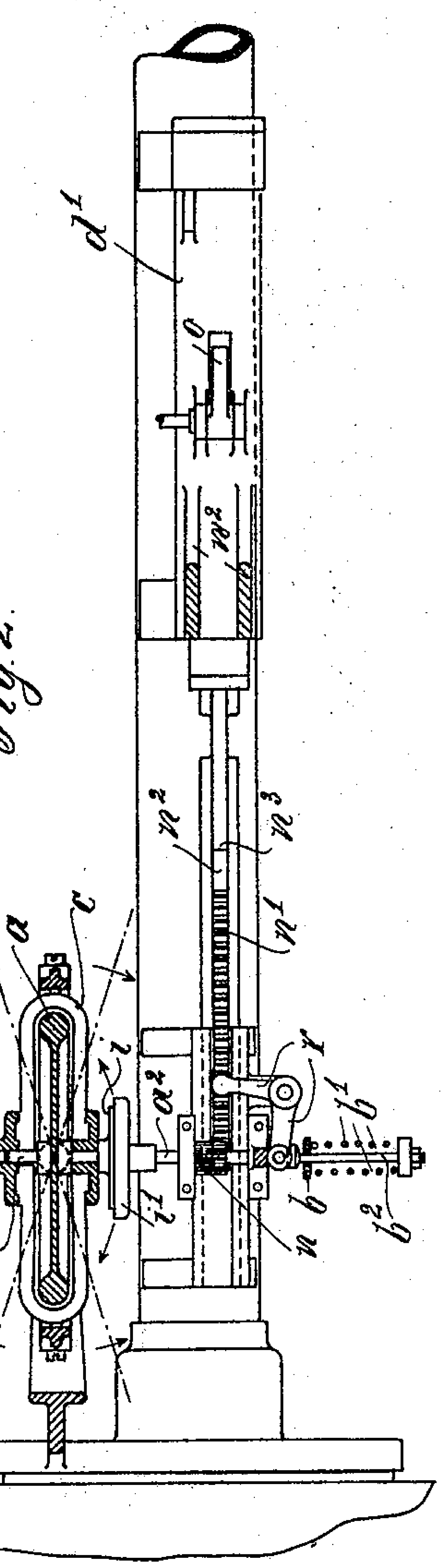

Fig. 2.

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Fig. 3.

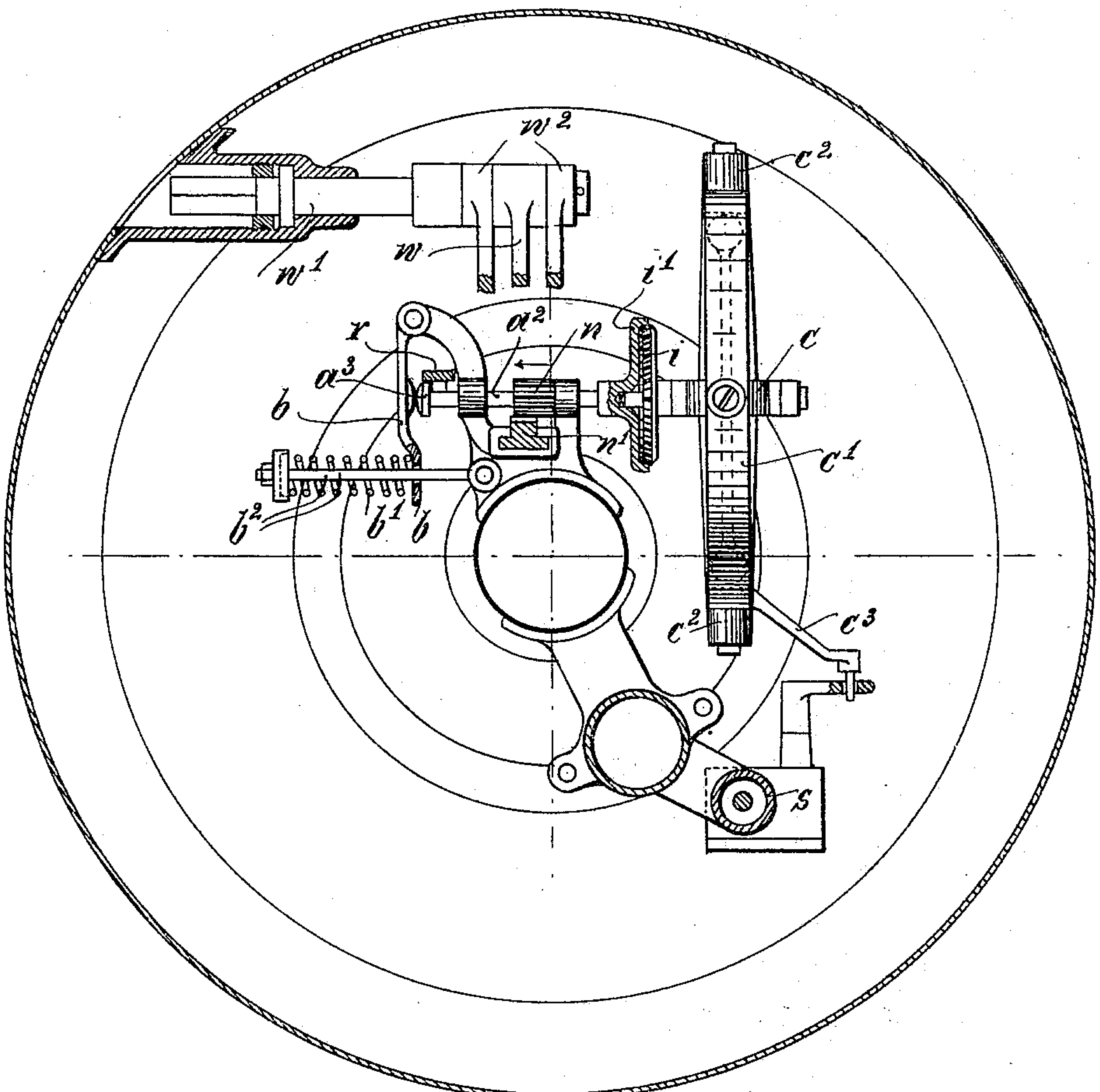

Fig. 6.

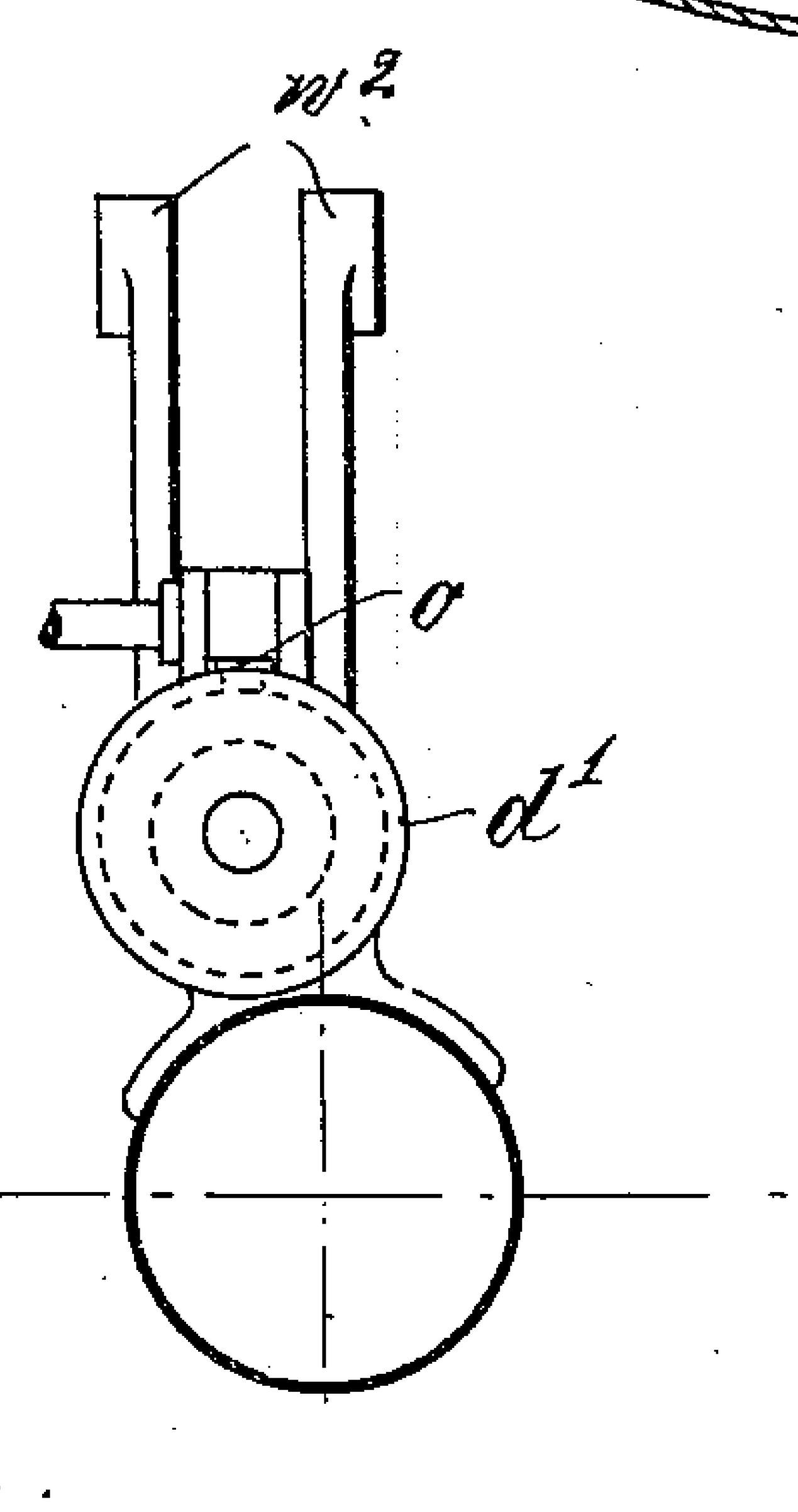

Fig. 5.

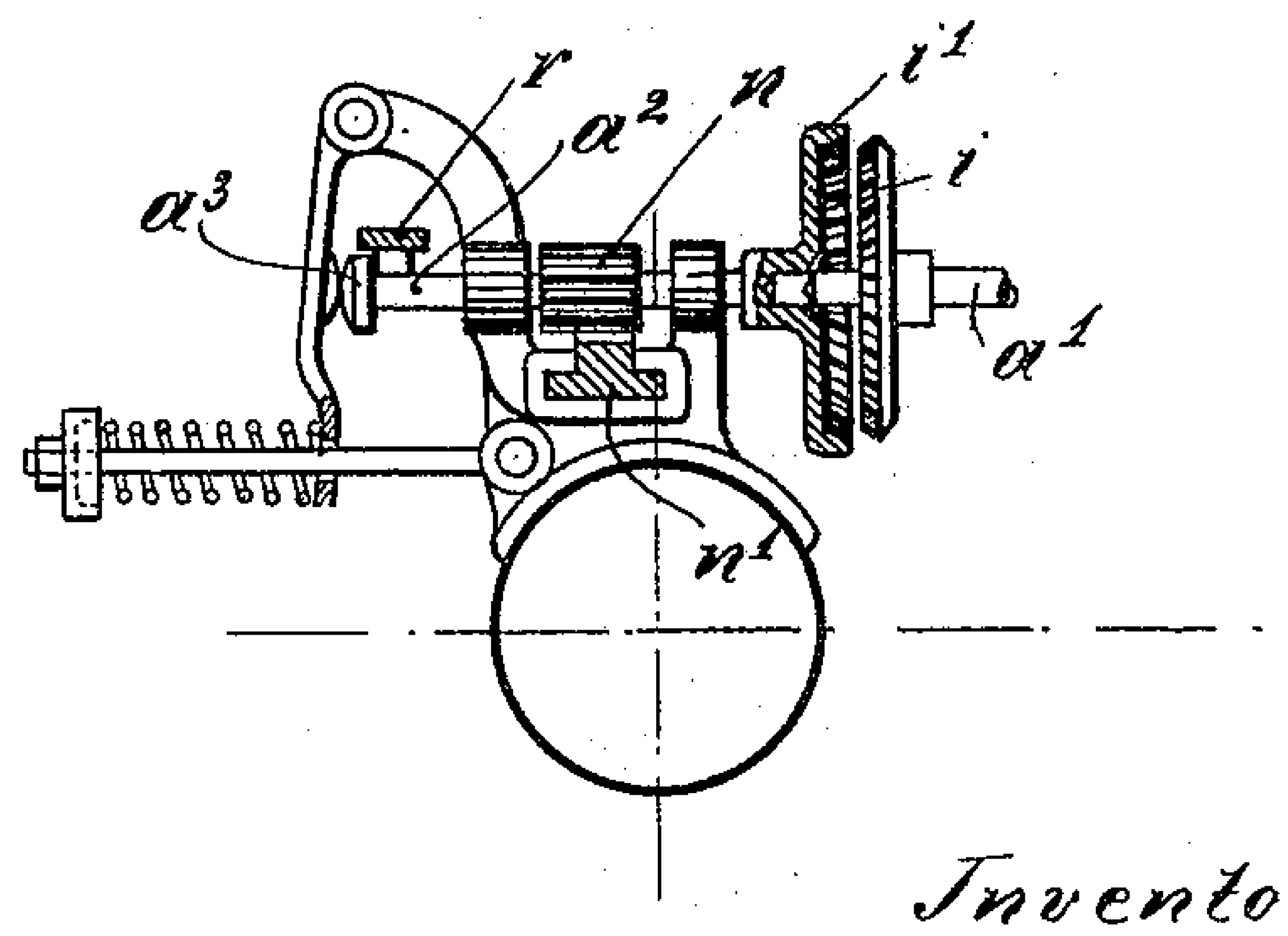

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Fig. 4.

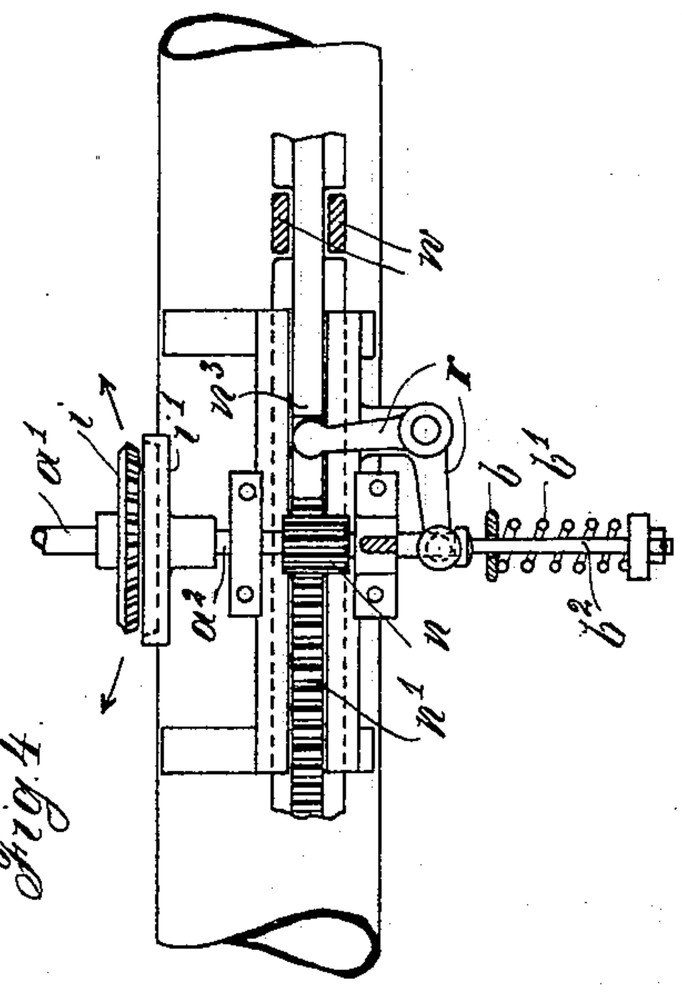
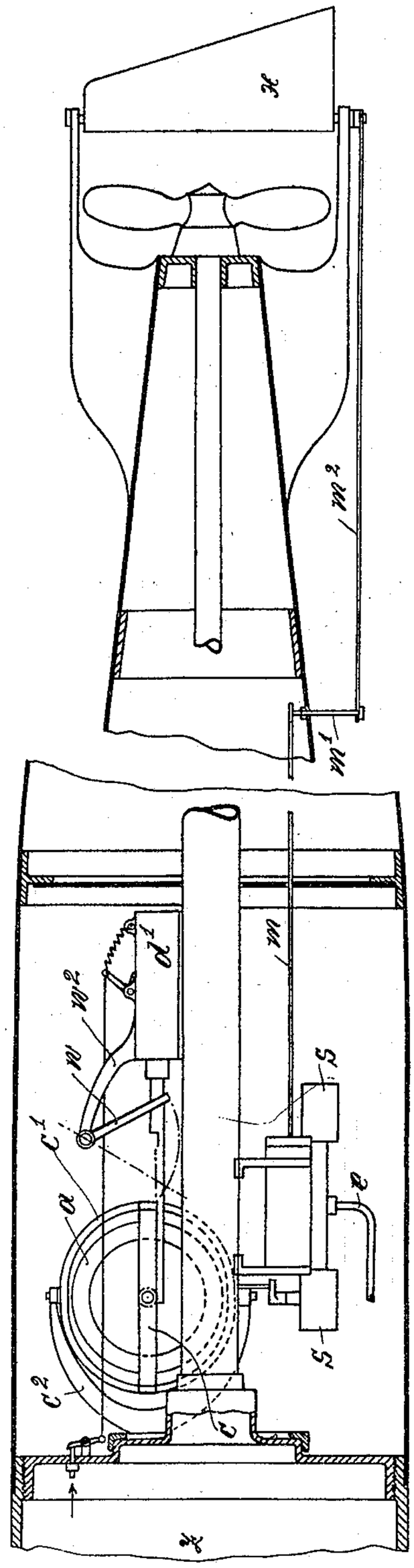


Fig. 4.



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UNITED STATES PATENT OFFICE.

EMIL KASELOWSKY, OF BERLIN, GERMANY.

AUTOMATIC STEERING DEVICE FOR TORPEDOES.

SPECIFICATION forming part of Letters Patent No. 607,440, dated July 19, 1898.

Application filed January 5, 1897. Serial No. 618,091. (No model.)

To all whom it may concern:

Be it known that I, EMIL KASELOWSKY, a subject of the King of Prussia, German Emperor, and a resident of Berlin, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Automatic Steering Devices for Correcting Lateral Deviations of Fish-Torpedoes, of which the following is an exact specification.

This invention refers to torpedo-steering devices of the kind in which is made use of a gyroscopic disk or wheel—*i. e.*, a disk or wheel that is arranged in such a manner as to be able to rotate around its axis proper, as well as to revolve around another axis lying rectangularly to said first-mentioned one. A disk or wheel arranged in such a manner tends to constantly maintain its plane of rotation, and the relative displacements of said wheel or disk and the torpedo occurring on the latter getting deviated may well be and have been used for suitably operating the rudder of the latter and causing the torpedo to be led back into its proper straight path.

The success with which the steering devices referred to have met up to now is a rather questionable one, especially what concerns torpedoes launched from a broadside-tube. The purpose of my invention, therefore, is to make said steering devices better suited for broadside-torpedoes, and I attain that object by arranging the gyroscopic disk or wheel in such a way that the plane of rotation is vertical and is situated or stands parallel to the longitudinal axis of the torpedo. Besides this main feature of my improved steering device other important features relate to the means for driving the wheel or disk and to means for uncoupling the latter from said former means, as will all be fully described hereinafter.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts throughout the different views, and in which—

Figure 1 is a vertical longitudinal section through the middle portion of a fish-torpedo furnished with my improved device. Fig. 2 is an upper view of the main parts of Fig. 1, some of said parts being in section and the shell of the torpedo being left away. Fig. 3 is a vertical cross-section through the middle portion of the torpedo. Fig. 4 is a separate view of the driving and uncoupling device shown in the middle portion of Fig. 2. Fig. 5 is a rear view of the mechanisms shown in Fig. 4. Fig. 6 is a rear view of the parts represented in the right-hand end of Fig. 2; and Fig. 7 is a vertical longitudinal section through the middle portion and the rear portion of the torpedo, showing the connection between the steering device and the rudder, this figure being drawn on a smaller scale.

Referring to Fig. 1, the shaft a' of the gyroscopic wheel a is arranged in the horizontal frame c. The latter is carried by the vertical frame c', which is held by the frame c^2. The frame c' may be rotated in the frame c^2 around a vertical axis. It is distinctly to be seen from Figs. 1 to 3 that the plane of rotation of the wheel a stands parallel to the longitudinal axis of the torpedo. During the time of its rest, as well as during the time of being driven, the shaft a' of the wheel a is connected with a shaft a^2, Figs. 2 to 5, by means of a coupling $i\,i'$. The shaft a^2 is arranged coaxially with the shaft a'. The shaft a^2 carries the movable part i' of said coupling and may be lengthwise displaced and is provided with a cog-wheel n, which meshes with a rack n'. The latter is secured to a hollow cylinder d, arranged within and guided by a casing d'. A spring d^2, situated within the cylinder d, tends constantly to move this latter (together with the rack n') outward or in the direction of the cog-wheel n, respectively. In the position shown in Fig. 1 said spring is strained or in its working position, respectively. The cylinder d is retained, however, by a pawl o, and is kept retained by said pawl until the torpedo is launched. In the moment of launching any suitable relieving device lifts the pawl o by the mediation of the lever o^2 and the rod o', and the rack n' is then quickly moved along below and together with the cog-wheel n. In consequence of the shaft a' of the disk a being connected with the shaft a^2 of the cog-wheel n the quick rotation of this latter causes a quick rotation of said disk a. When the rack n' has finished its movement, a recess n^2, Fig. 1, has arrived below the cog-wheel n. The latter may thus turn free of the rack or the rack cannot impede the quick rotation of the disk a, respec-

tively. The effect of the device or, more precisely, the degree of effect depends on the disk a being kept free of any impediment. The shaft a^2, with the cog-wheel n, forms also impediments after the disk a has been put into rotation. To uncouple said shaft from the shaft a', there is provided a bell-crank lever r, Figs. 2 and 4, which may act with an arm against a knob-like projection a^3, arranged at an end of the shaft a^2. Said action is effected by the corner or point n^3, Fig. 1, of the rack or rod n' pushing upon the other arm of said lever. The shaft a^2 is thereby lengthwise displaced in such a direction that the two parts $i\,i'$ of the coupling are disconnected, as shown in Figs. 4 and 5. This occurs obviously instantly after the actuation of the disk a, which may thus freely rotate, as well as revolve.

When the torpedo deviates from its straight path, there occurs a turning of the disk a relatively to the torpedo or, more precisely, a turning of the torpedo relatively to the disk a. An arm c^3, projecting from the frame c' and connected with the distributing device of a servi-motor, causes in consequence of said turning an actuation of the distributing slides or valves proper of said device. Said slides or valves are arranged within the casing s, Figs. 1, 3, and 7. Servi-motors being already known to experts in the present time, I think I may abstain from showing and describing the details of such a motor, and I therefore confine myself to remarking that said motor is employed for operating the rudder x of the torpedo and that it is driven by compressed air. The latter is contained within the reservoir z and is led to the motor by the pipe e. The piston-rod m of the motor operates the rudder by the mediation of the shaft m' and the rod m^2. The shaft m' is of course provided with crank-arms, as is also the lower end of the shaft of the rudder.

The piston-rod m is of course in any case displaced in such a direction that the rudder (turned by this displacement in a corresponding direction) deviates the torpedo back into its normal or straight path. Owing to the particular arrangement of the disk a and to freeing the latter of all disturbing influences, the correction of the deviation takes place with an accuracy never attained heretofore.

For the sake of completeness I finally remark that putting the spring d^2 under tension is effected by means of a movable arm w, Figs. 1 and 3, fixed to a shaft w'. The latter is supported by brackets w^2, projecting from the casing d'. The free end of the shaft w' is formed into a prism to receive a key, as distinctly shown in Fig. 3. It is further to be seen from this figure that to keep the parts $i\,i'$ of the coupling in proper contact a spring b', held by an arm b^2, is provided. Said spring acts upon an arm or a lever b, which in its turn presses against the broadened end of the shaft a^2.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. In a fish-torpedo, having a gyroscopic disk or wheel, adapted to rotate around a horizontal axis, and to revolve around a vertical one, and having said disk or wheel arranged so as to have its plane of rotation stand parallel to the longitudinal axis of the torpedo, the combination with the shaft of the said disk or wheel, and with the driving device for the latter, of a coupling situated between the disk or wheel and said driving device, said shaft having a cog-wheel adapted to be longitudinally displaced, of a rack gearing with said cog-wheel, and of means for longitudinally displacing said rack; and other means for automatically disconnecting said coupling; said other means being adapted to be operated by the said rack, for the purpose as described.

2. In a fish-torpedo having a gyroscopic disk or wheel adapted to rotate around a horizontal axis, and to revolve around a vertical one, and having said disk or wheel arranged so as to have its plane of rotation stand parallel to the longitudinal axis of the torpedo, the combination with the shaft of the said disk or wheel, and with another shaft arranged coaxially with the said former one, of a coupling situated between said two shafts; said coaxial shaft having a cog-wheel, and being adapted to be longitudinally moved; a rack gearing with said cog-wheel, and means for longitudinally moving said rack; and a lever, adapted to be turned by the said rack on the latter reaching the end of its path, and to move the said other shaft so as to disconnect said coupling, for the purpose as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EMIL KASELOWSKY.

Witnesses:
W. HAUPT,
HENRY HASPER.