No. 771,541. PATENTED OCT. 4, 1904.

E. ERICSON.

FRICTION GEAR.

APPLICATION FILED OCT. 9, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.

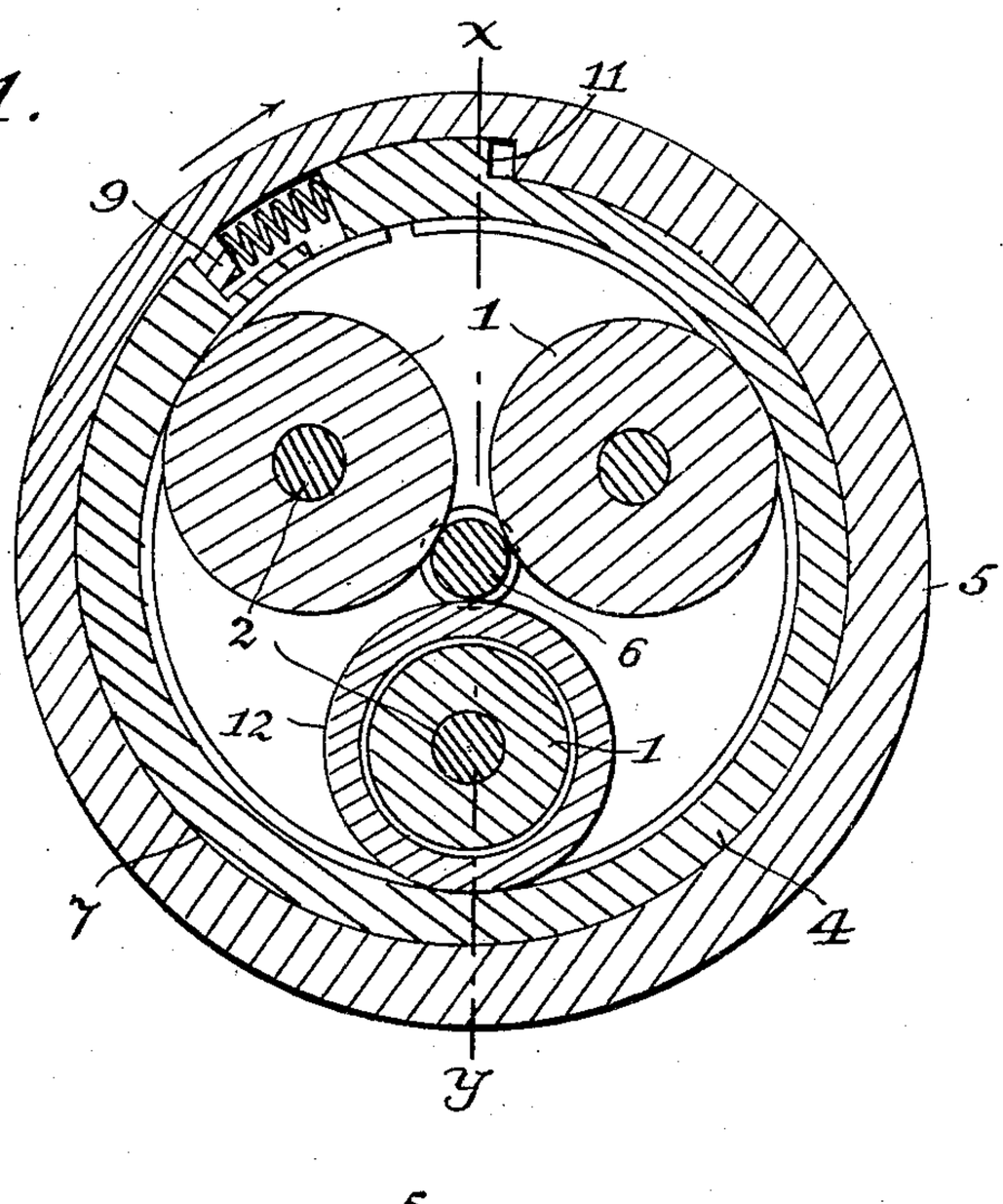
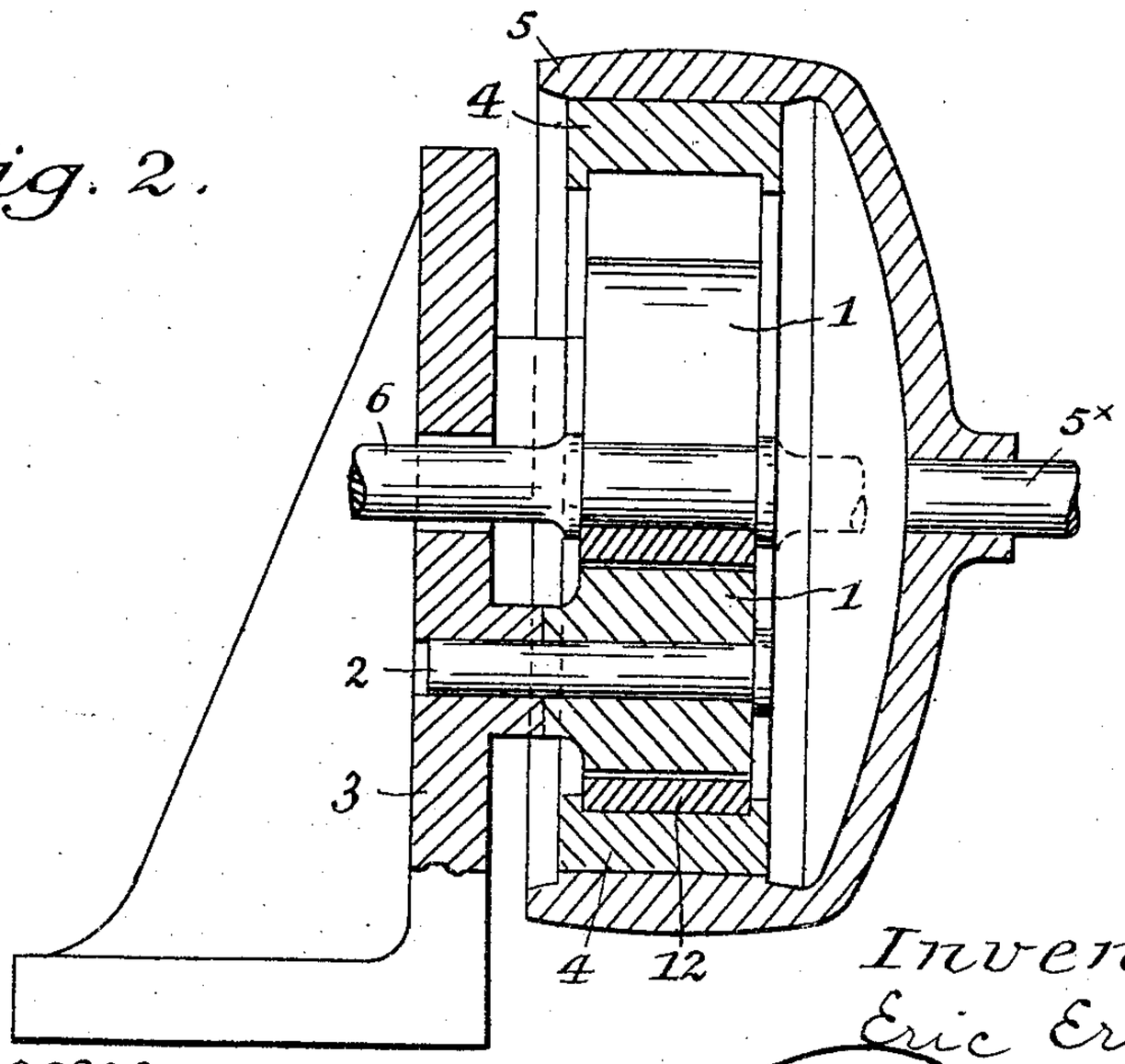


Fig. 2.



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NO MODEL. 5 SHEETS—SHEET 2.

Fig. 3.

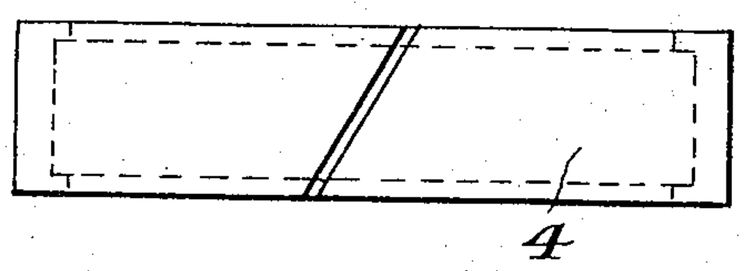
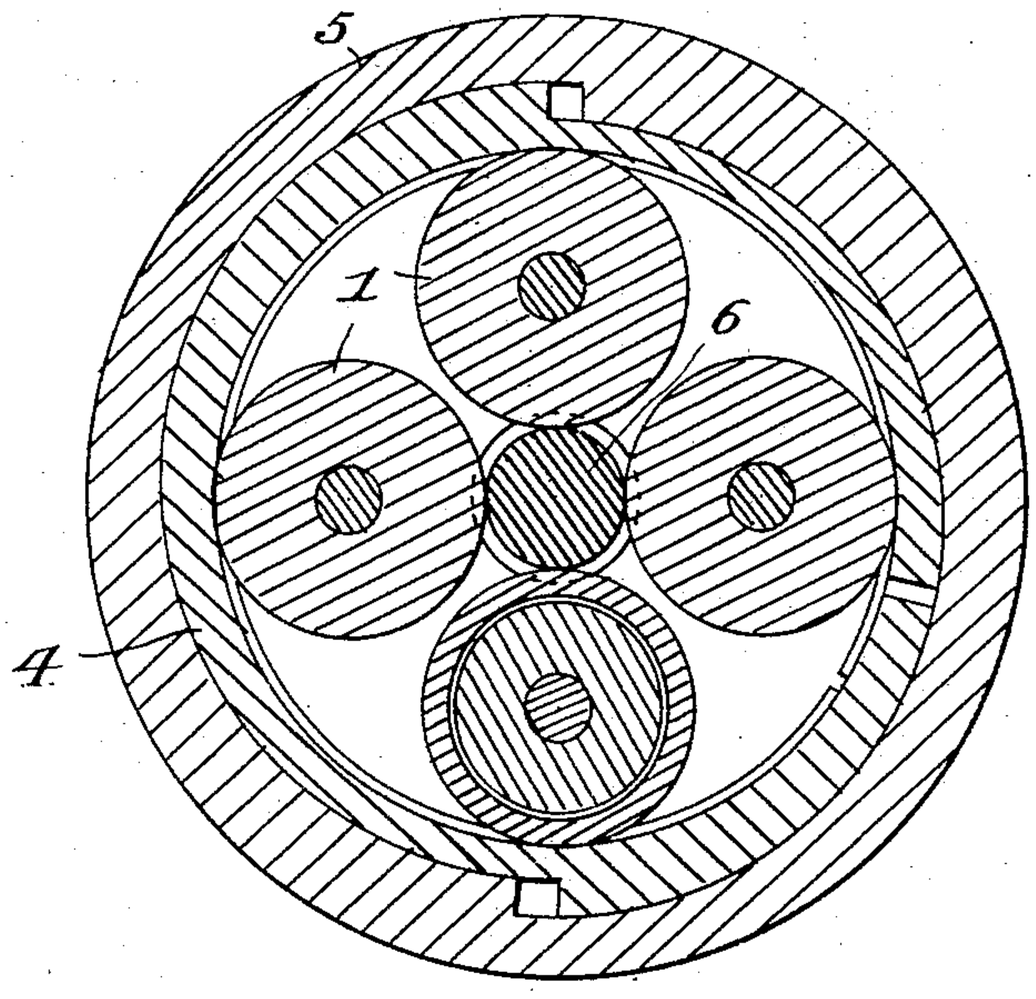


Fig. 4.



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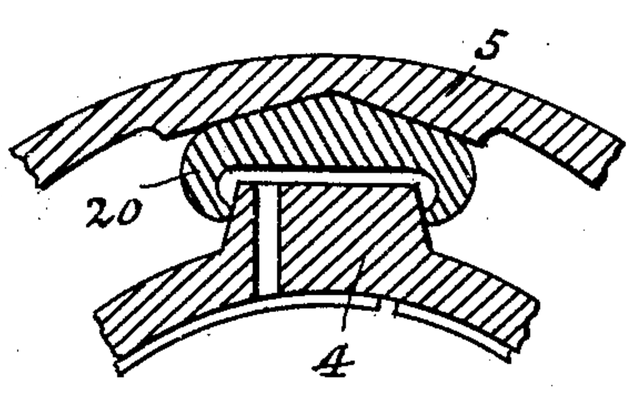
NO MODEL. 5 SHEETS—SHEET 3.

Fig. 8.



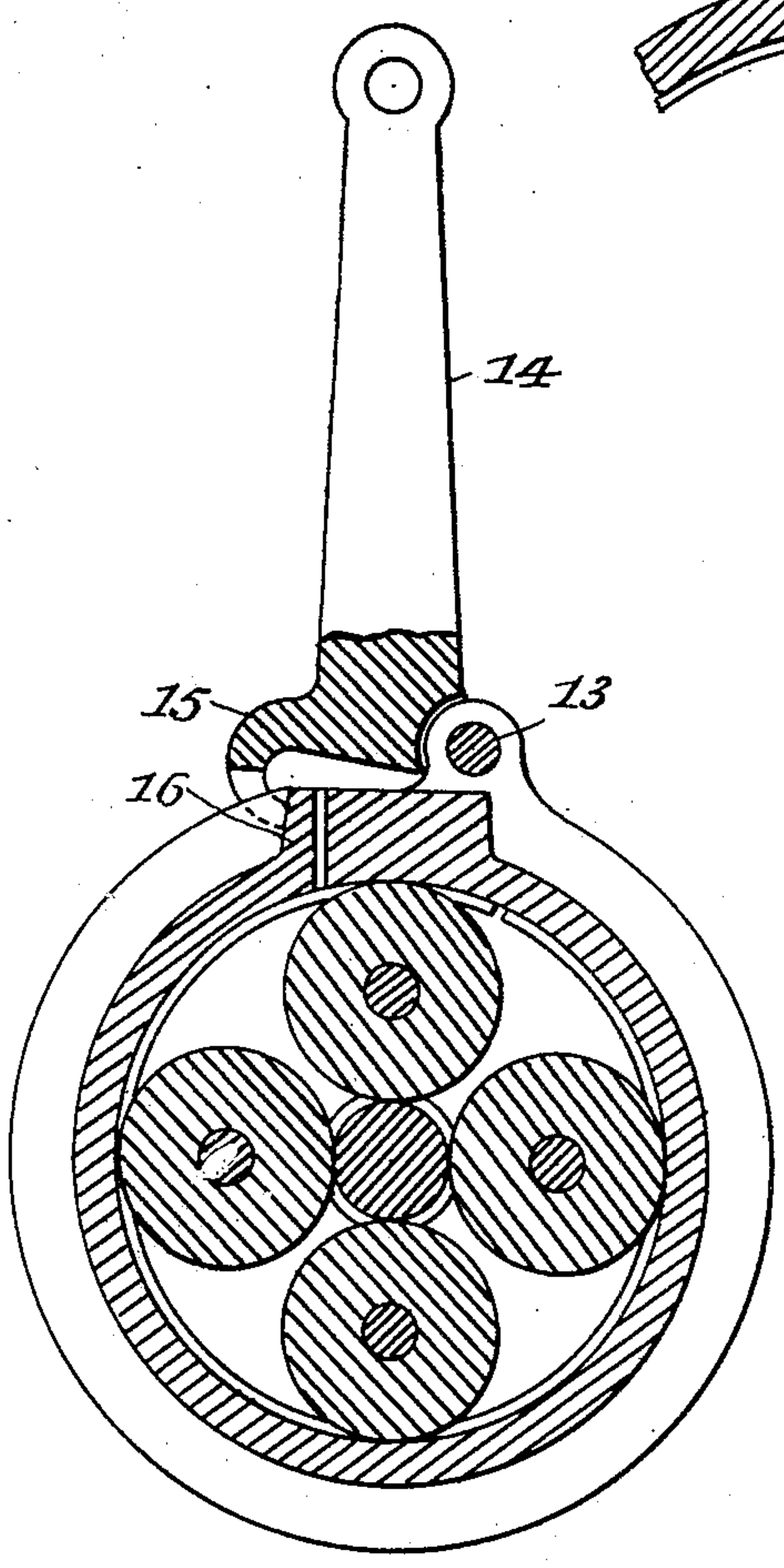


Fig. 5.

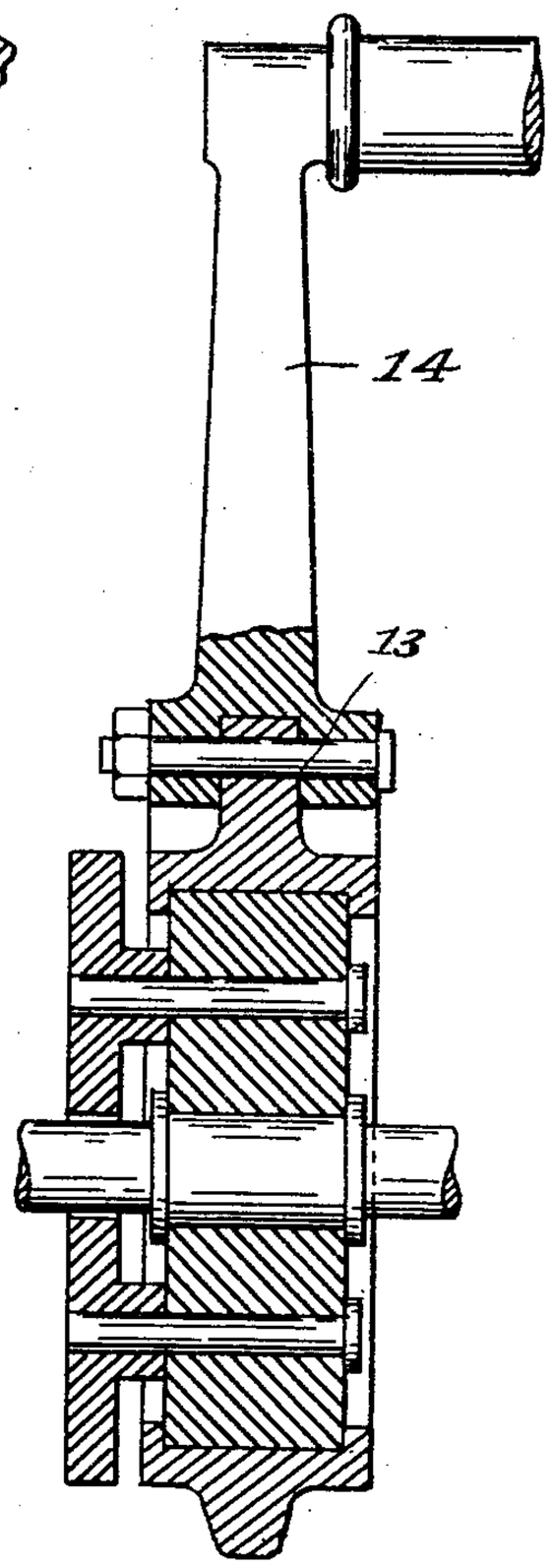


Fig. 6.

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APPLICATION FILED OCT. 9, 1903.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 7.

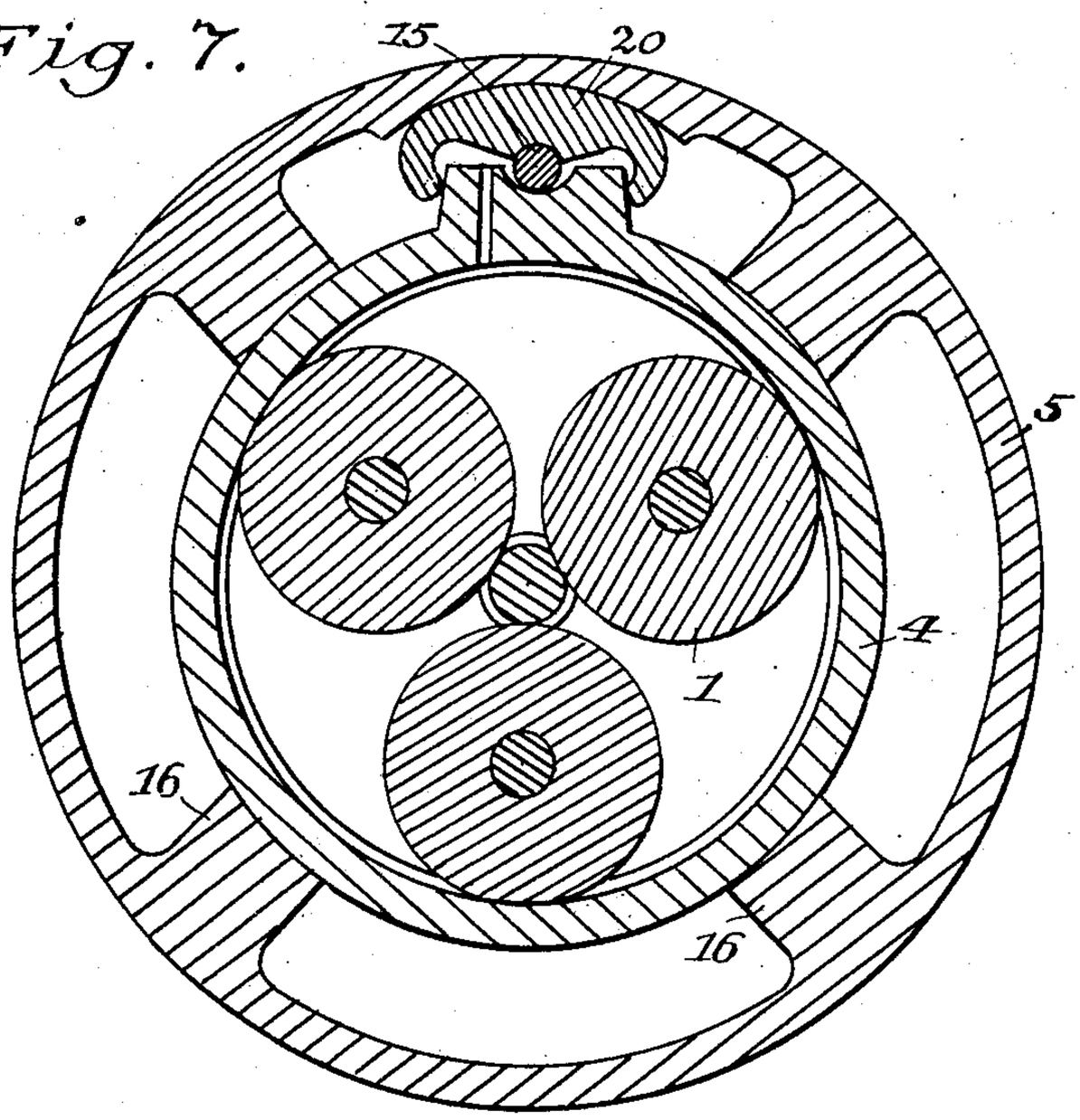
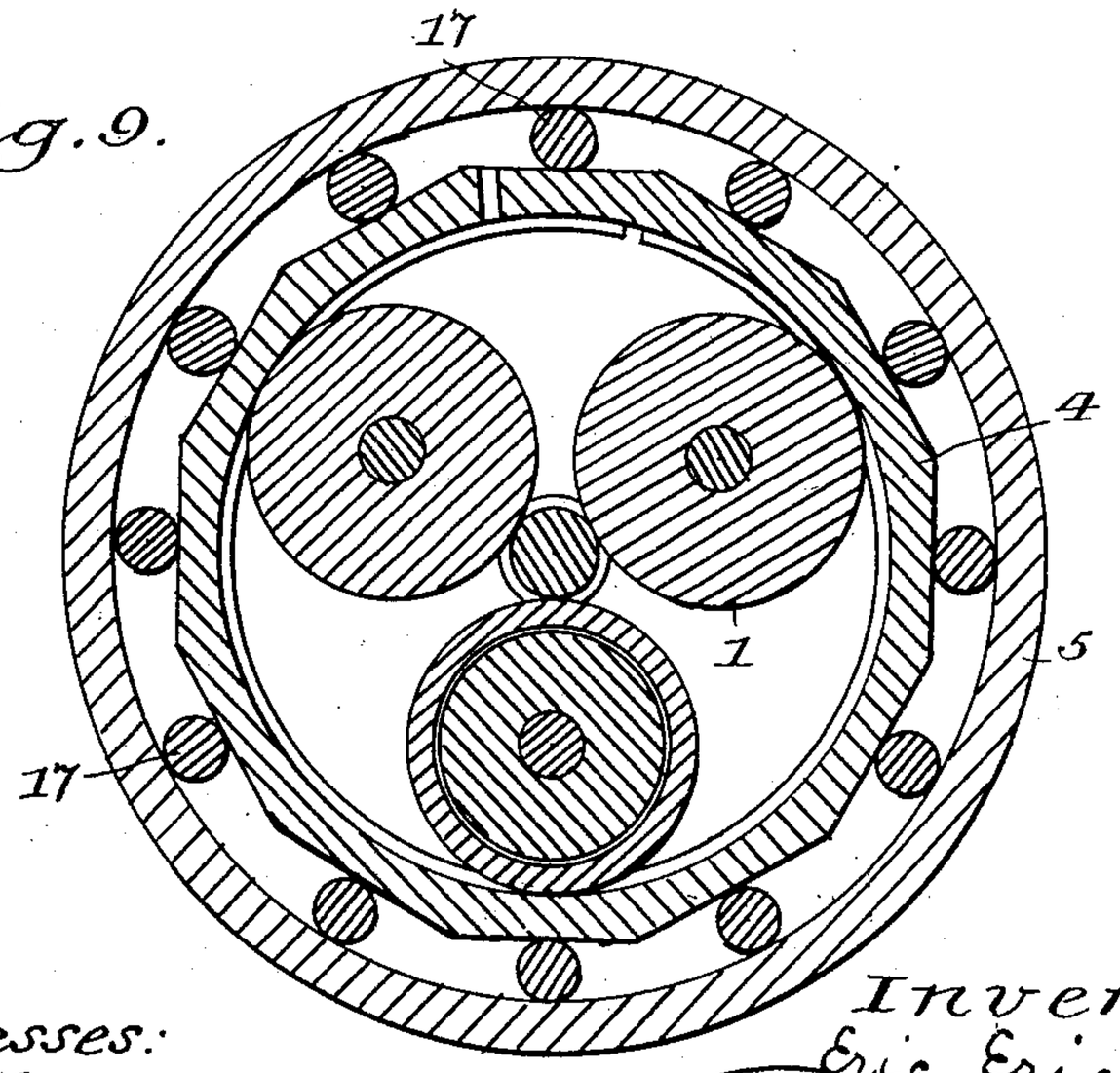


Fig. 9.



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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 10.

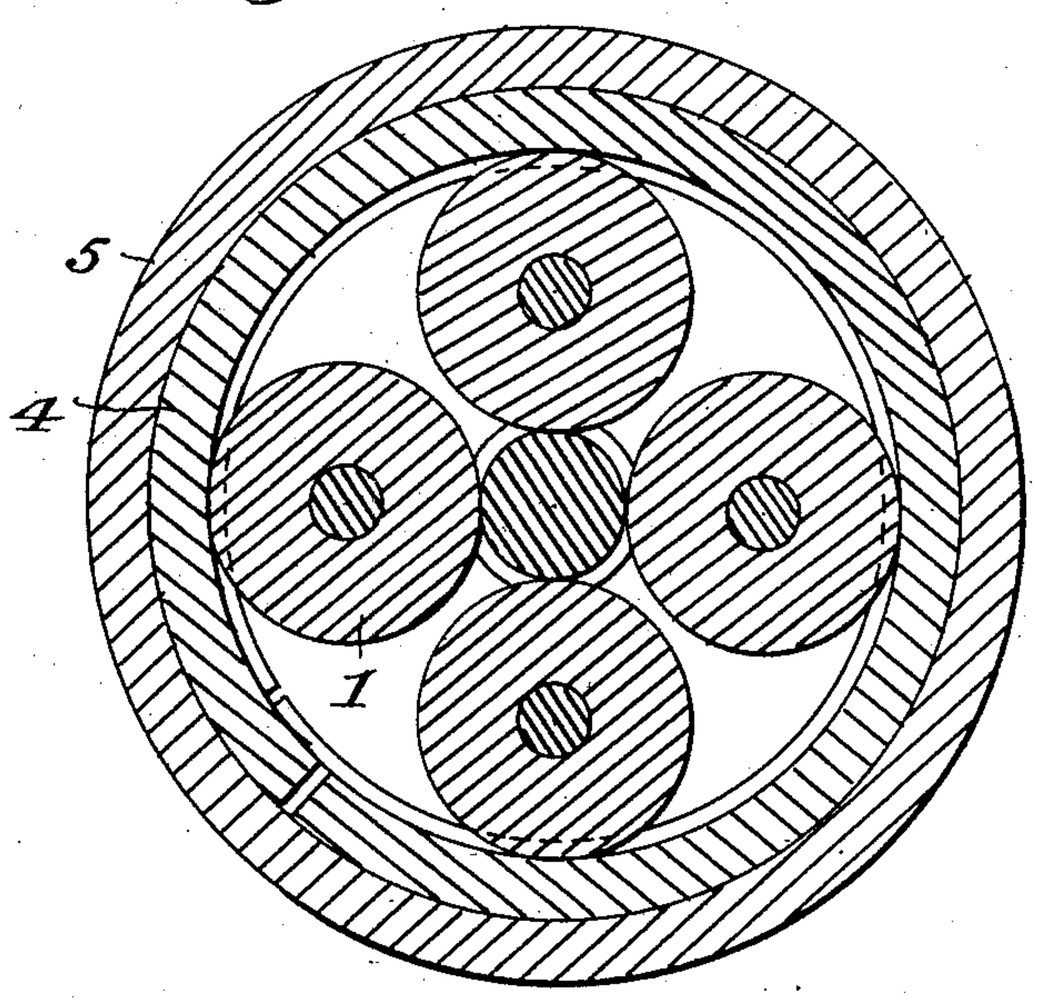
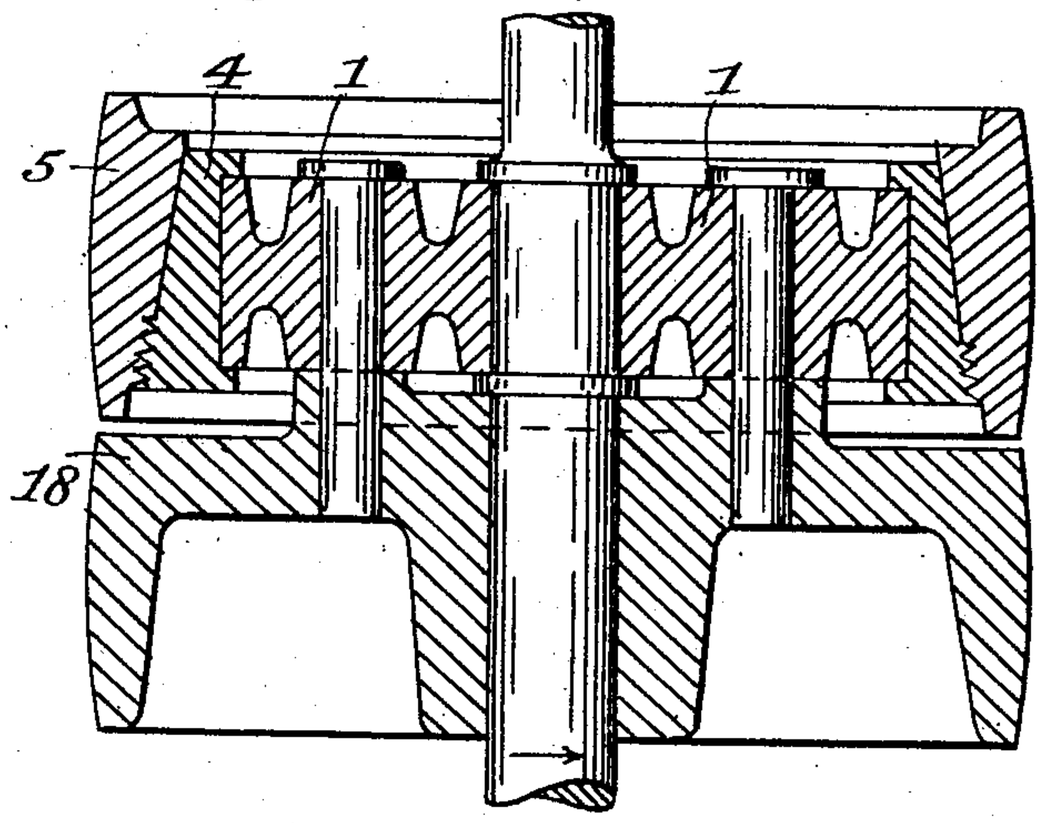


Fig. 11.



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No. 771,541. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

ERIC ERICSON, OF STOCKHOLM, SWEDEN, ASSIGNOR TO CARL ALRIK HULT AND OSCAR WALFRID HULT, OF STOCKHOLM, SWEDEN.

FRICTION-GEAR.

SPECIFICATION forming part of Letters Patent No. 771,541, dated October 4, 1904.

Application filed October 9, 1903. Serial No. 176,379. (No model.)

To all whom it may concern:

Be it known that I, ERIC ERICSON, a subject of the King of Sweden and Norway, and a resident of Parkgatan 16, Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Friction-Gears, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to such friction-gears as consist of friction-rollers or friction-rings mounted on pivots on one common rotating disk or on a stationary support and bearing against an inner endless ring-shaped track and against a pivot or a shaft which is located between the said rollers and is driven or from which motion is transmitted. The pressure on the said rollers must be greater or less, according to the power which is to be transmitted. In many cases the load of the gearing varies very often, and thus it happens that if the pressure between the parts of the gearing is constant the gearing when operating is more tightened than is necessary, this being obviously a disadvantage, as in such a case the gearing runs heavy and is subjected to a great wear.

This invention has for its object to remove the said disadvantage, and for that reason it comprises such an arrangement in the gearing by means of which the pressure between its parts is automatically adjusted. This object is attained by providing the gearing with a tightening device adapted to expand or contract the ring which forms the endless track and is acted upon by the driving power.

In the accompanying drawings several forms of the said device are shown.

Figure 1 is a cross-section of a gearing arranged in accordance with this invention, and Fig. 2 is a longitudinal sectional view on the line *x y* of Fig. 1. Fig. 3 is an edge view of the split ring in a reduced scale. Fig. 4 is a cross-section of a second modified form of the invention. Fig. 5 is a cross-section, and Fig. 6 is a longitudinal sectional view, of a third modification. Fig. 7 is a cross-section of a fourth modified form of the invention. Fig. 8 is a sectional detail view of a fifth modification. Fig. 9 shows a sixth modification in cross-section, and Fig. 10 is a cross-section, and Fig. 11 a longitudinal sectional view, of a seventh modified form of the invention.

Rollers 1 are pivoted on the stationary disk 3 by means of pins 2 and are surrounded by the ring 4, forming the endless track. The said ring 4 is split obliquely, as shown in Fig. 3, in such manner as to be expanded or contracted. On the ring 4 a ring 5 is mounted, forming the rim of a pulley, a friction-disk, a toothed wheel, or the like. Thus in the first-mentioned case the whole forms a pulley, during the rotation of which power is transmitted to or from the shaft 6, situated between the rollers. The contact-surfaces 7 of the rings 4 and 5 do not form a circle concentric with the shaft 6, but a spiral, as shown. The outer ring 5 is movable on the ring 4, so as to be rotated upon the same. Owing to the described arrangement of the parts, the ring 5 when rotated in the direction indicated by the arrow—*i. e.*, in the direction in which the length of the radius of the spiral contact-surfaces increases—will contract the ring 4. In this manner the pressure on the rollers is increased. The belt or the pulley as a whole runs around the shaft 6 in the direction of the arrow. Thus if the resistance (the load) increases the ring 5 will be moved on the ring or track 4 in the manner stated above, the latter being thus contracted and the pressure on the rollers increased until equilibrium is restored. If the resistance decreases, the ring 5 is returned to its initial position to the ring 4. This return movement can be effected by a spring or in some forms of the construction by the tension of the ring 4. In Fig. 1 the track 4 has a recess in which a lug 9 on the ring 5 projects, a spring 10 being mounted between the said lug and the end of the split ring 4. The said spring 10 tends to turn the rings 4 and 5 in opposite directions, so as to decrease the pressure between the same. In this manner the adjustment is effected entirely automatically. For limiting the turning movement of the rings, effected by the said spring, the transition from the longest radius of the spiral surface to the shortest radius of

the same is in the shape of a sharp shoulder 11, serving as an abutment. Fig. 1 also shows a springy ring 12, mounted on a roller 1.

In Fig. 2 the ring 5 is shown fixed on a driving-shaft $5^{\times}$ by means of arms. The action of the mechanism is obviously the same as in the first-stated case, as the only difference consists in the fact that no belt is placed around the ring 5; but the latter is connected with a power-transmitting shaft.

In the modification shown in Fig. 4 the contact-surfaces of the rings 4 and 5 consist of two spiral surfaces, each occupying one-half of the circumference. Two or more spiral surfaces may also be provided, and as a further modification may be mentioned that other suitable curved or plane surfaces may be substituted for the spiral surfaces.

Figs. 5 and 6 show a further modification of the invention, consisting in that the one end of the ring or track 4 carries the pivot-pin 13 of a lever-arm 14, which by means of a hook 15 acts upon a lug 16, projecting from the other end of the said ring 4. If the track is rotated by means of the said lever-arm in the direction indicated by the arrow, the track is tightened up around the rollers with a greater or less force, according to the resistance to be overcome. In Figs. 5 and 6 the lever consists of a crank-arm. The gearing arranged as shown in the said figures may suitably be employed for the driving of hand centrifugal apparatus and similar apparatus. The arrangement shown in Figs. 5 and 6 may be so modified that the lever-arm is connected with a pulley or the like loosely revolving on the shaft.

In the modification shown in Fig. 7 the ends of the ring or track 4 are provided with lugs embraced by a double hook 20, the outer convex side of which is mounted in a correspondingly-shaped groove in the inner side of the inclosing ring 5. The said hook is supported at its inner side by a pin 15, bearing against the ring or track 4 and forming the fulcrum of the hook. A swinging movement of the hook, effected by turning the ring 5 on the ring 4, contracts the ring 4 and increases the pressure on the rollers owing to the reduction of the inner horizontal distance between the ends of the hook, Fig. 7. The ring 5 has inside a considerably-greater width than the ring 4, but is provided inside with projections 16 or the like, directed toward the ring 4.

In Fig. 8 the hook 20 and the ring 5 bear against each other by means of two plane surfaces forming an angle with each other. The mode of action is almost the same as in the arrangement shown in Fig. 7, with the addition of a certain movement of the hook 20 toward the center of the ring.

In Fig. 9 a plurality of rollers are mounted between the ring 5 and the outer side of the ring 4, which is provided with projections or is polygonal. When the said rollers are at the middle of the sides of the polygon, the contraction of the ring 4 is the minimum; but if the ring 5 is turned on the ring or track 4 the said rollers are moved toward one end of the said sides and contract the track 4.

In Figs. 10 and 11 the ring 5 is screwed on the ring 4. The screw-threads, however, occupy only a small part of the breadth of the ring, the rest being conical. Owing to the conical bearing-surfaces the turning of one of the rings in relation to the other will contract or expand the ring 4, depending on the direction in which the turning movement takes place. The disk 18, on which the pivots of the rollers 1 are mounted, consists of a pulley, as shown, or of a toothed wheel.

The gear arranged in the manner last stated may be employed for transmitting movement in one direction or the other. If the shaft is the driving member and rotates continually in the direction indicated by the arrow, the pulley 5 is rotated in one direction if the pulley 18 is kept still by means of a suitable brake, and, vice versa, if the pulley 5 is kept still the pulley 18 is rotated in the opposite direction.

It may be stated that there is no novelty in reducing or increasing the pressure on the rollers by expanding or contracting, respectively, the ring 4; but hitherto the increasing and reducing operations have been effected by contracting and expanding the ring by hand. Consequently the novelty of this invention consists in the fact that the driving power transmitted by the gear acts by means of a suitable tightening device adapted to act upon the track in such manner that the track is contracted, and the said pressure is increased when the resistance increases, while a special spring or the like or the tension of the track proper causes a reduction of the pressure when the resistance or the driving power increases. The increasing of the power mentioned above may be dependent on the increasing of the load, for instance, by the connection of a machine which is to be driven or on the fact that the gear is to be driven with greater speed.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a friction-gear the combination of a split ring, a shaft, rollers mounted in the said ring and bearing against the same as well as against the shaft between the rollers, which is to be driven or from which motion is transmitted, and a tightening device acted upon by the driving power transmitted by the gear in such manner that the ring is contracted to a greater or less extent according to the strength of the said power and the pressure on the rollers is thus adjusted automatically substantially as and for the purpose set forth.

2. In a friction-gear the combination of a split cylindrical ring, rollers mounted on the

said ring and bearing against the same, a shaft between the rollers, which shaft is to be driven or from which the motion is transmitted and parts forming a tightening device, both ends of the ring being connected by the said parts so that the driving power acting upon the said parts gets a more or less contracting action upon the ring according to the strength of the said power in order to produce a greater or less pressure on the rollers.

3. In a friction-gear the combination of a split cylindrical ring, rollers mounted in the said ring and bearing against the same, a shaft 6 between the rollers, and an oscillating part connecting both ends of the ring in such a manner that the driving power acting upon the same gets a more or less contracting action upon the ring according to the strength of the said power.

4. In a friction-gear the combination of a split cylindrical ring, rollers mounted in the said ring, the shaft between the rollers and a turnable hook connecting the ends of the ring and having the shape of a lever fixed to one end of the ring, said lever engaging the other end of the ring, to which lever the driving power is applied in order that the lever-arm may act as a device tightening the ring to a greater or less extent for automatically effecting the adjustment of the pressure on the rollers, substantially as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ERIC ERICSON.

Witnesses:
ERNST SVANQVIST,
AUG. SORENSEN.