PATENT SPECIFICATION

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165,107

COMPLETE SPECIFICATION.

Improvements in or relating to Wedge-belt Pulleys.

I, ADOLPHE KEGRESSE, of 28, Avenue de Tourville, Paris, a citizen of the Republic of France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is known that in power transmission by means of wedge belts and wedge-belt pulleys the coefficient of friction increases as the angle formed by the sides of the belt decreases. In other words, the smaller the angle, the better the belt wedges and consequently the better the driving. It is therefore preferable in practice to employ wedge-belts, the sides of which form the smallest possible angle.

Off setting the advantage of the small angle is the disadvantage that if the angle is brought below a certain value (about 30°) the belt is pinched in the pulley groove at the points where it enters and leaves. This pinching is not only very injurious to the belt but reduces the efficiency of the transmission or drive to such an extent as to render it almost useless.

With a view to obtaining a high coefficient of friction between the pulley and belt and at the same time providing against pinching at the points where the belt enters and leaves the pulley, it has been proposed to constitute the wedge belt pulley by two half-pulleys mounted on spindles the axes of which intersect each other, said pulley halves having mutually engaging sets of teeth with inclined planes (one set on each pulley half) said sets of teeth constituting means of adjustment of the pulley halves towards and away from each other.

The invention is concerned with pulleys of this type and consists in the combination with the sets of teeth with inclined planes of supplementary means for adjusting the pulleys towards and away from each other said means comprising either semi-spherical thrust members, or a nut adjustment, or both.

Figures 1, 2 and 4 are different constructions of the pulleys in section and half-section;

Figure 3 is a half elevation of the pulley shown in Figure 2.

Figure 5 shows a development of the inclined planes.

Each pulley is constituted by two half-pulleys 1 (Figures 1—2 and 4). Each half-pulley can be mounted with a slight amount of friction on its spindle, or to rotate with the same. In all cases, the axes of the spindles of the half-pulleys intersect at a point, the position of which may vary.

It will be readily understood that the cheeks of the two half-pulleys which form the groove and rotate on intersecting spindles, are not parallel, the result being that the belt is wedged on a fairly small portion of circumference, so that the points where it enters and leaves the pulley are absolutely free, and there is even a certain play depending on the angle at which the spindles are set.

Figure 1 shows in half-section a device combining automatic adhesion with the necessary obliquity of the two half-pulleys relatively to each other.

In this construction the half-pulleys are fast on their spindles.

7 is the driving spindle. This spindle may be supported by a forked bracket 8, the outer branch 9 of which affords free passage, without play, to the driving spindle 7. The inner branch 10 forms a fixed base for the circular casing in two

[*Price* 1/-]

parts 11 and 12. The whole is rigidly connected together by bolts 13. The part 11 of the said casing affords a free passage, without play, to the driving spindle 7, for which it forms a second support, the first one being constituted by the prong 9 of the fork 8. Between the half 11 of the circular casing and the fork prong 9 is keyed to the spindle 7 the driving half-pulley. The other part 12 of the circular casing forms a support for a secondary spindle 14, disposed angularly to the driving spindle 7. The axes of the two spindles intersect each other at the point 0. On the outer end of the spindle 14 is keyed the other half-pulley.

The spindles 7 and 14 of the two half-pulleys being disposed angularly to each other, the planes of rotation of the cheeks are not parallel. A powerful grip of the wedge belt is therefore obtained, whilst at the same time the belt is free at the point of entering and leaving the groove.

The primary spindle 7 terminates at the inner end in a head carrying a set of teeth 15 with inclined planes of special cross-section, the diagrammatic development of which, is shewn in Figure 6. The secondary spindle 14 has at its outer end an adjusting nut 14^a for the pulley half 1 and at its inner end a cup-shaped member affording a seat, with suitable play, about the head of the primary shaft 7. The interior of the cup is provided with internal grooves 16 and is secured, by means of the inner nut 17, to a rim 18 carrying teeth with inclined planes, corresponding to the teeth 15 on the head of the primary spindle 7.

The secondary spindle 14 and the corresponding half-pulley can move laterally in the bracket 12. The primary spindle 7 drives, with a constant speed, the half-pulley keyed to it. The secondary spindle 14 and the corresponding half-pulley are driven through the inclined planes 15, the effect of which, is to adjust the friction automatically.

It will be seen from the preceding description that as the teeth 15 with inclined planes are secured to spindles, the axes of which intersect each other, they cannot come into contact throughout the whole of their diameter. This defect which may have drawbacks in heavy power transmission is eliminated by the following construction (Figure 2).

The two half-pulleys are mounted loose and without play on the bracket 19 (Figure 2), the hollow head of which is constituted by two trunnions 20 and 21. The axes of the said trunnions intersect each other at the point 22. The desired wedging of the belt in the groove of the pulleys is therefore obtained within the desired limits.

The driving half-pulley may be driven in various ways by a cardan joint 23 (Figure 2), by a gear wheel 24 (Figure 4), by worm, by chain wheel *etc. etc.*

To the driving pulley is rigidly secured, by means of bolts 25 (Figure 2), the secondary spindle 26 terminating for the purpose in a disc to suit the method of driving. The spindle 26 passes with a suitable play through the head 20—21; it terminates at the end opposite to the fixing disc, in a screwthreaded portion with a nut 27 preceded by grooves 28, the whole being intended for locking the special head 29 carrying teeth 30 with inclined planes as in Fig. 5.

On the cylindrical portion of the head 29, is mounted with a slight amount of friction, a semi-spherical member 31 with a radius R, the centre of which coincides with the point of intersection 22 of the spindles of the half-pulleys. This member 31 is provided with teeth with inclined planes engaging with the teeth 30 of the head 29. It has further on its large diameter another set of teeth 32 (Figures 2 and 3), intended to drive the second half-pulley provided in its turn with a set of inner teeth corresponding to the teeth 32. The lateral pressure due to the wedging of the belt, always keeps the hollow semi-spherical member of the secondary pulley in engagement with the corresponding portion of the part 31.

The working of this pulley is as follows:

The spindle 26 driven with the primary half-pulley transmits its movement of rotation to the semi-spherical member 31 through the teeth 30 with inclined planes. This movement is transmitted to the secondary half-pulley through the teeth 32 which have the necessary shape and sufficient play to enable the teeth to execute a movement relatively to each other, due to the inclination of the spindles of the parts in contact.

In the present case, the inclined planes will bear on the whole of their circumference, since the two parts in contact are mounted on each other, and therefore have one and the same axis.

The lateral pressure above referred to, will be normally taken up by the semi-spherical parts provided for the purpose. The centre of these semi-spheres coinciding with the intersection 22 of the spindles, it follows that the semi-spherical surfaces in contact will absorb, by a normal friction, the relative movement of the secondary pulley and of the part 31, both mounted on different spindles intersecting at 22, as already stated.

A suitable lateral play enables the secondary half-pulley and the semi-spherical part 31 supporting it, to move to the desired length under the action of the system with inclined planes, and thus to automatically adjust the friction.

Figure 4 shows by way of example a modified construction of the system hereinbefore described.

As previously described, the two half-pulleys rotate about the head of the support 19 forming the hollow trunnions 20 and 21, the axes of which intersect at the point 34 (Figure 4) which forms the fixed centre for the radius R (same figure). The secondary spindle 35 terminates, at the side of the point 34, in a head with teeth 36 similar to the teeth 32 of Figures 2 and 3. These teeth 36 (Figure 4) engage with suitable play with the corresponding teeth provided on the driving half-pulley, and drive the secondary spindle 35. The inner face of the head of the said spindle is rounded to correspond with the radius R of the centre 34. It is against this rounder surface that the corresponding part of the driving pulley presses. The other end of the spindle 35 engages with the secondary half-pulley by means of a plate 37 keyed to the spindle 35 and held in place by a nut 38. The head 37 has inclined planes 39 which engage with the corresponding projections secured to the secondary half-pulley. The working of the said pulley is the same as that of the pulley previously described.

The supports of the pulley described may of course be varied, whilst retaining the same arrangements in principle. Thus, they may have a double fork, or a treble fork, the third prong of which may afford passage to an extension of the secondary shaft. These pulleys may be further supported by outer brackets or by a combination of an outer bracket and a central bracket *etc*.

It has been proposed to provide adjustable wedge belt pulleys comprising pulley halves rotating on intersecting axes and having a nut adjustment or a combined nut and semi-spherical adjustment for the pulley halves but without sets of teeth with inclined planes and no claim is made to such herein.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a wedge belt pulley of the type comprising two half-pulleys mounted on spindles the axes of which intersect each other, said pulley halves having mutually engaging sets of teeth with inclined planes (one set on each pulley half) which teeth constitute means of adjustment of the pulley halves towards and away from each other, the provision of supplementary means for adjusting the pulley-halves towards and away from each other said supplementary means comprising either semi-spherical thrust members or a nut adjustment or both in combination.

2. Wedge-belt pulleys substantially as described and illustrated with reference to Figures 1, 2, 3 and 4 of the accompanying drawings.

Dated this 15th day of June, 1921.

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Chartered Patent Agents.

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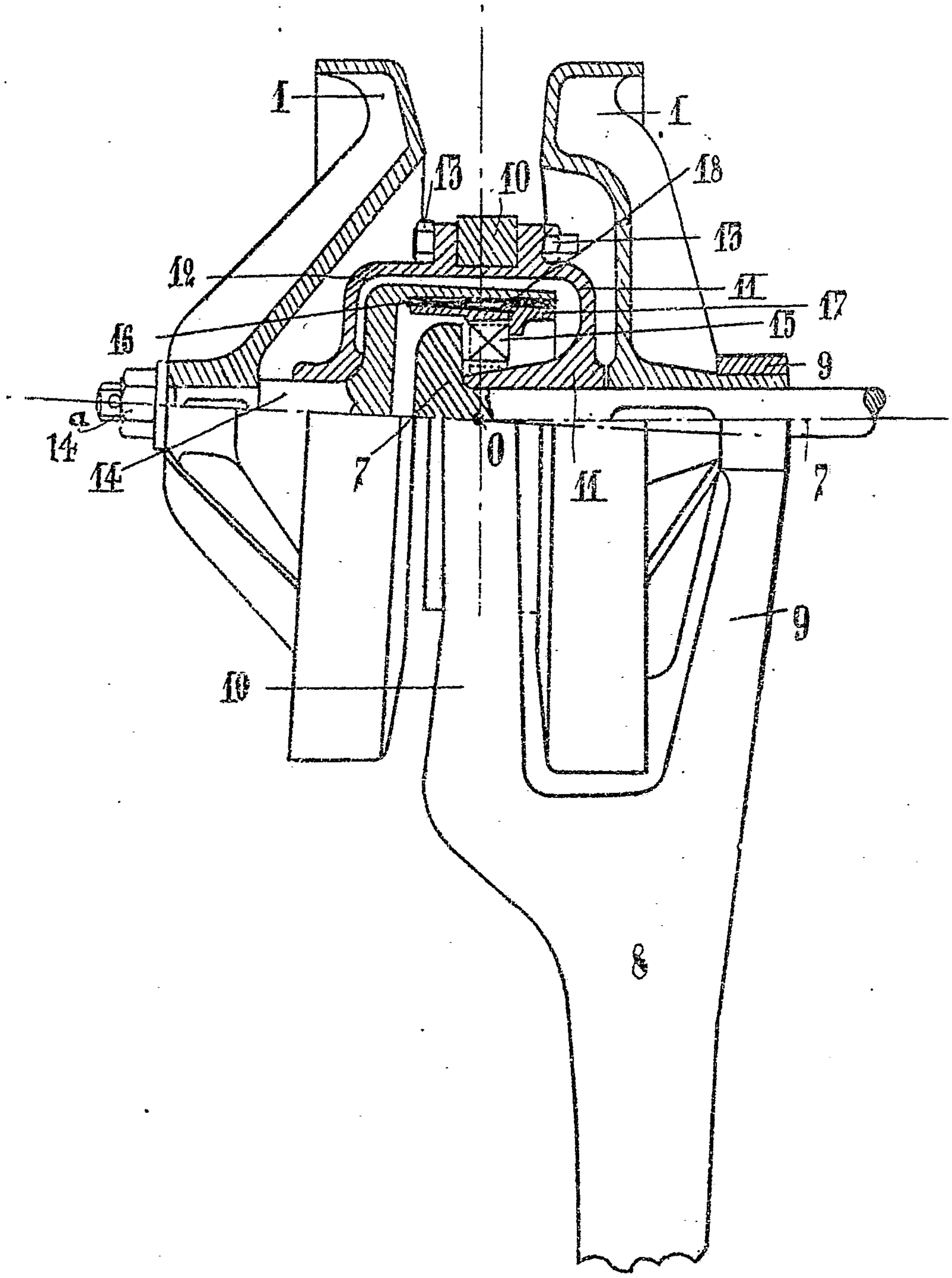
SHEET 1

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig.1.



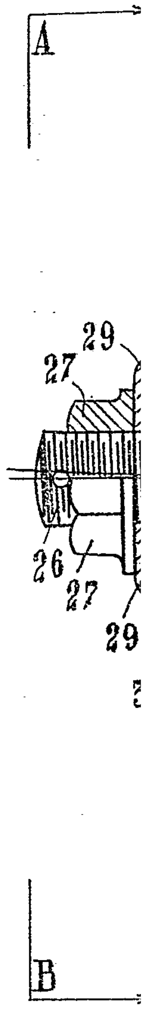
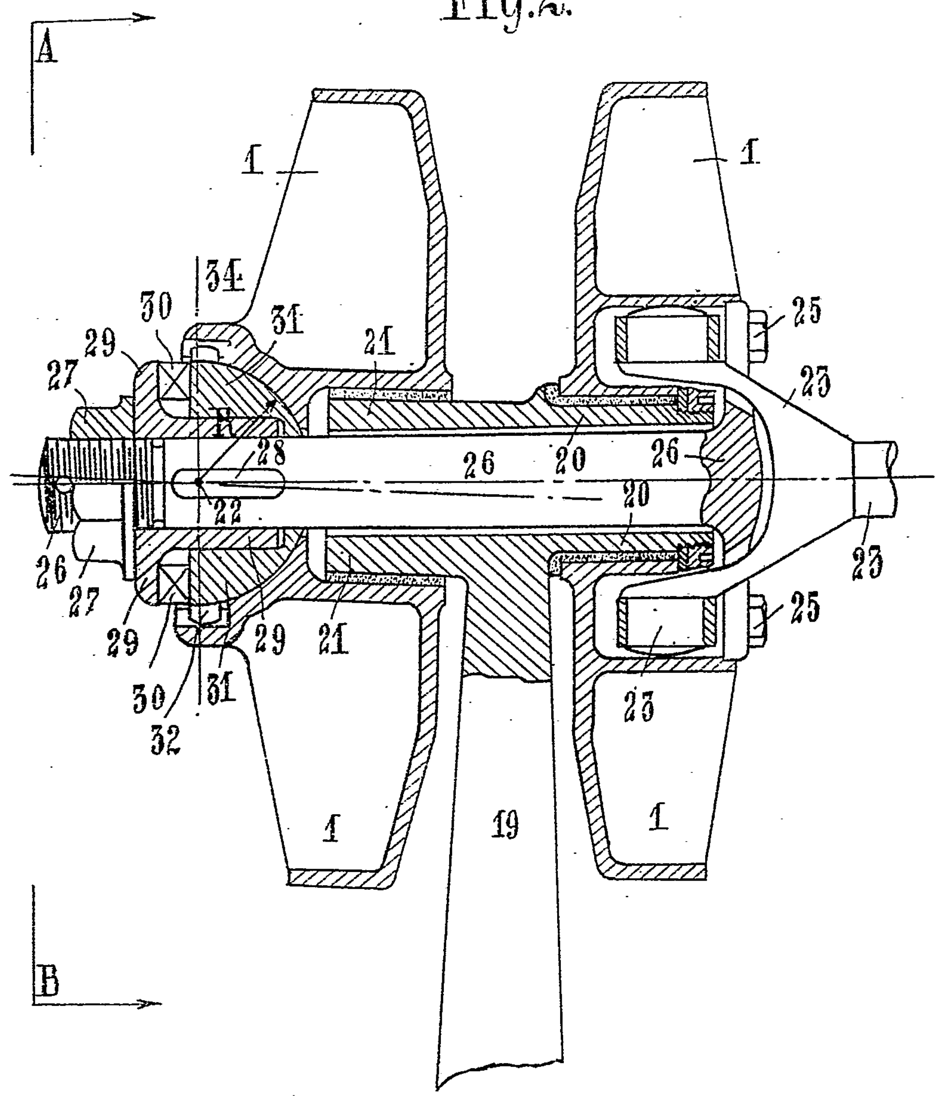


Fig.2.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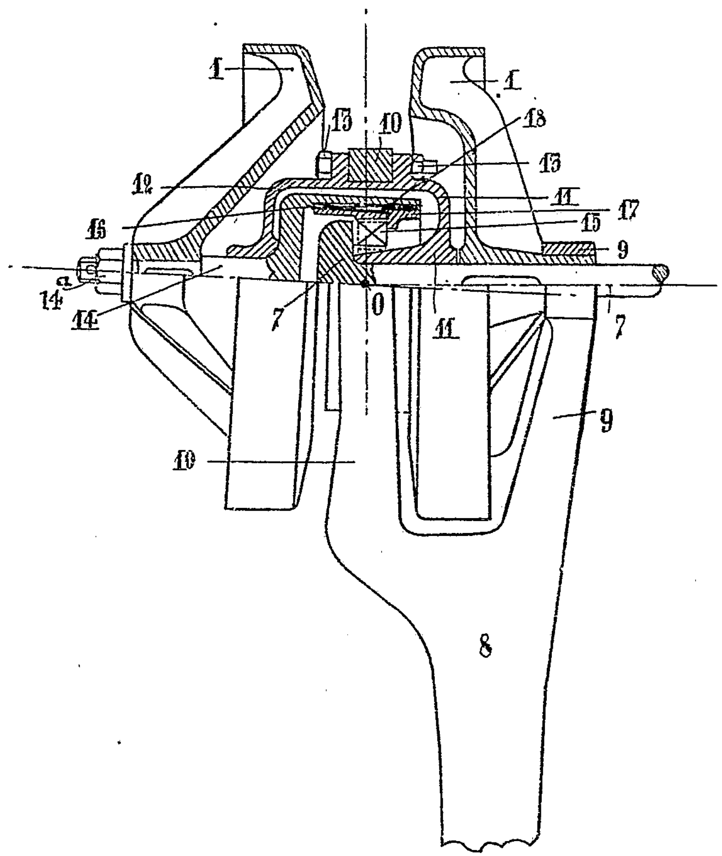
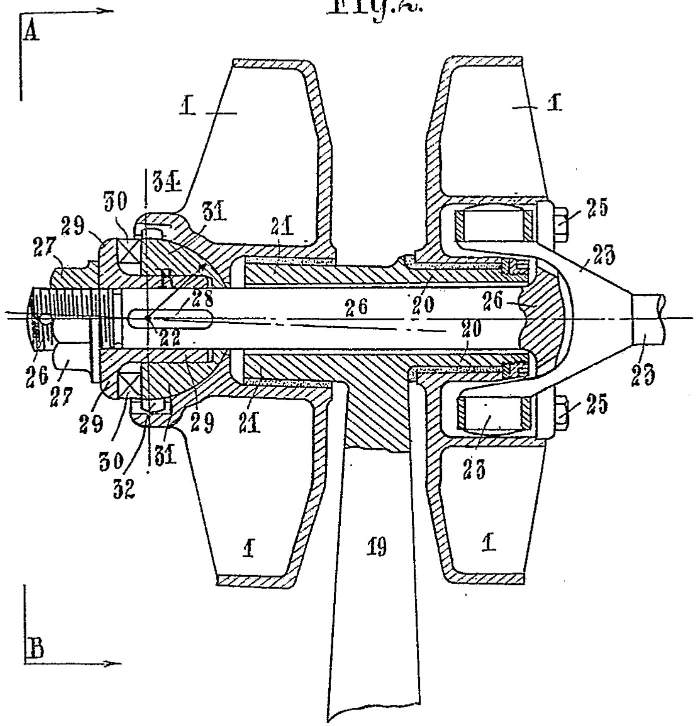
SHEET 1

Fig.1.



SHEET 2

Fig.2.



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SHEET 3

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Fig.3.

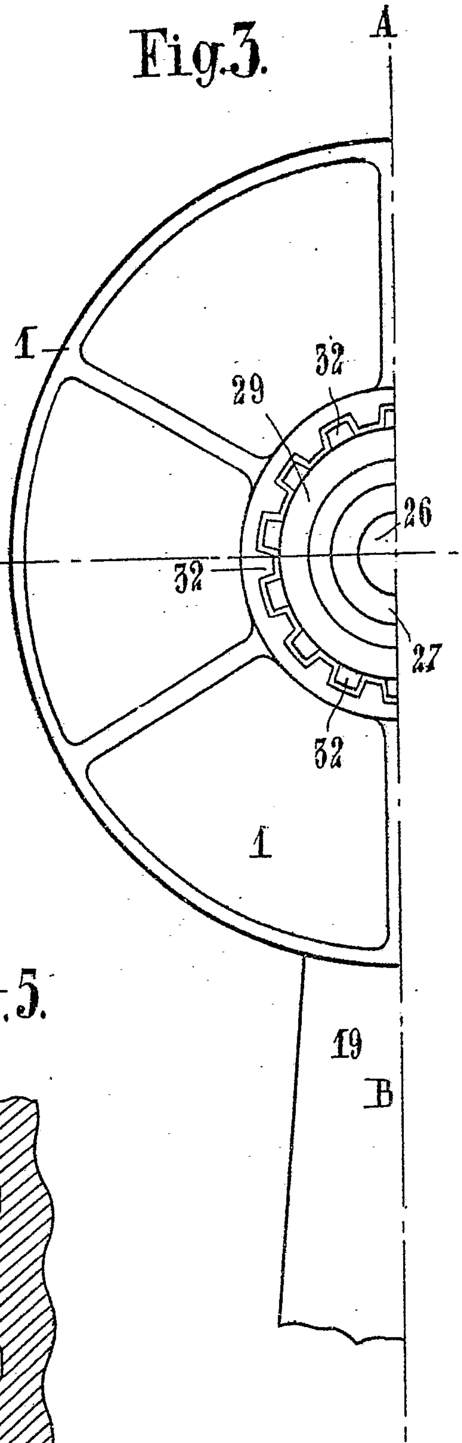
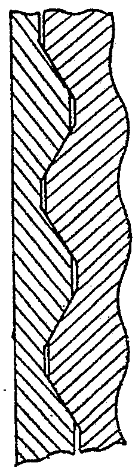


Fig.5.



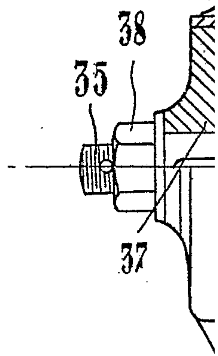


Fig.4.

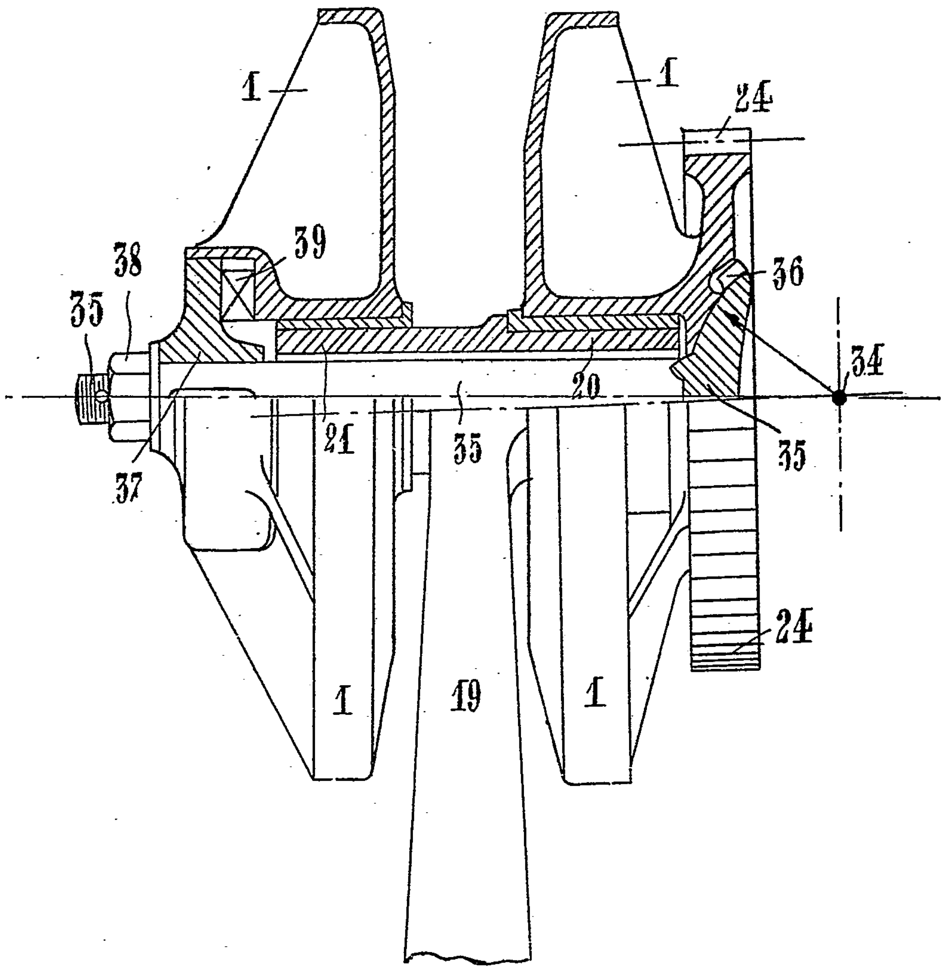


Fig.3.

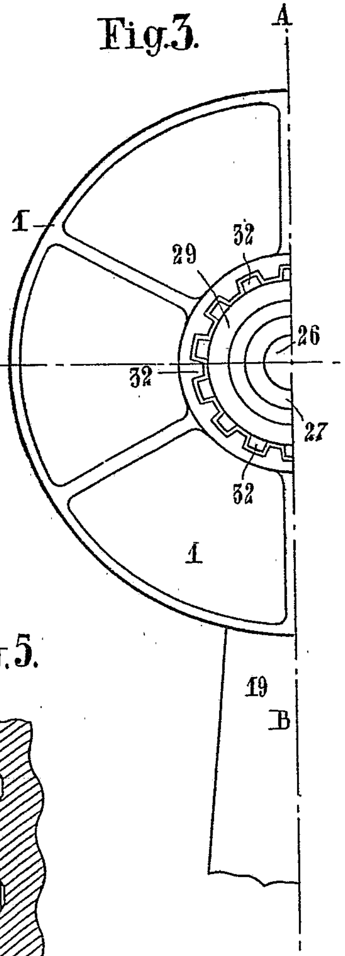


Fig.5.

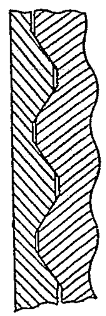


Fig.4.