[Second Edition.]

PATENT SPECIFICATION

Application Date: April 5, 1923. No. 9341/23. 217,684
" " April 14, 1923. No. 10,188/23.
" " July 12, 1923. No. 18,057/23.
One Complete Left: Feb. 5, 1924.
Complete Accepted: June 26, 1924.

PROVISIONAL SPECIFICATION.

No. 9341, A.D. 1923.

Improvements in or relating to Unidirectional Driving Mechanism.

I, GEORGE CONSTANTINESCO, of "Carmen Sylva", Beechwood Avenue, Oatlands Park, Weybridge, in the County of Surrey, a subject of the King of Great Britain and Ireland, do hereby declare the nature of this invention to be as follows:—

The present invention relates to clutches and unidirectional driving devices for various purposes, particularly to such devices as are described in my Patent Specification No. 205,293.

In the said specifications I have described a clutch comprising a sliding member situated between an oscillating member and a rotating member and arranged so that relative movement of rotation between said sliding member and said oscillating member causes a movement of said sliding member at right angles to the movement of rotation with consequent engagement and jamming together of the three members said sliding member having teeth or the equivalent on one side and smaller teeth or a friction surface on the other side brought into close engagement by the movement of said sliding member at right angles to the direction of rotation. In such devices unless the clearance between the friction surface and the slider is extremely small in the free position there is a certain relative movement between the oscillating member and the slider which gives rise to shocks when the slider overruns the oscillator at the end of the driving stroke and if a rubber pad is employed as the friction surface, this relative movement increases as the rubber becomes worn, so that the gear is apt to become noisy owing to the sudden shocks produced when the slider overtakes the oscillator.

The present invention consists in providing means whereby a permanent force sufficient to overcome the inertia of the slider is caused to act on the slider so as to prevent it overrunning the oscillator and producing shocks at the end of the driving period.

The invention further consists in means whereby this permanent force can be reversed so that it keeps the slider permanently in the non-engaging position allowing free relative movement between the oscillator and the rotor in both directions.

The invention also consists in providing means whereby the permanent force acting on the slider can be readily reversed, so that when applied to a reversing clutch capable of driving in either direction, the direction of rotation of the rotor may be reversed by merely reversing the direction of action of the permanent force.

The invention further consists in the improved clutches and unidirectional driving devices hereinafter described.

In carrying the invention into effect according to one example of the invention applied to a reversible unidirectional driving device, the oscillator is provided with teeth inclined on both sides, corresponding teeth being provided on the slider. A lever pivoted at a fixed point is provided in a convenient position adjacent to the slider, one end of the lever being connected by a spring to one side of the slider and another point on the lever on the opposite side of the fulcrum being connected to another spring to a point on the slider diametrically opposite the point of attachment of the first mentioned spring.

It will be seen that by this arrangement

[Price 1s.]

by merely moving the lever the force acting on the slider can be reversed with the result that the direction of rotation of the rotor is also reversed.

It will be seen that instead of springs any suitable pneumatic, rubber, hydraulic, or electric device capable of exerting a force and allowing resilience may be employed.

The above described apparatus is particularly suitable for cases in which rubber or other friction surface is employed, as it allows wear to be taken up and also allows for the smaller clearance during working which is experienced owing to the swelling of the rubber when it becomes heated.

The apparatus, however, can be used in combination with sliders having teeth on both sides and in fact in conjunction with all the apparatus described in my patent specifications above mentioned. Further instead of teeth, suitable spiral gears may be employed to give the relative movement between the slider and the oscillator at right angles to the direction of rotation.

As the inertia forces are proportional to the square of the frequency and amplitude, it follows that the force to be applied to the slider need not be constant. To obtain such a variable force means can be arranged by using the centrifugal force of governors or centrifugal hydraulic pressure by which the force will be automatically increased or decreased according to the frequency of the oscillator. Such governors may be conveniently driven by the primary shaft.

The force produced by a centrifugal governor is proportional also to the square of the frequency, and therefore such an arrangement leads to automatic adjustment of the force required to act on the slider. For example, a hydraulic centrifugal governor as described in my Patent Specification No. 146,642 may be employed, the hydraulic pressure obtained being caused to act on pistons or diaphragm with or without the use of springs as an intermediary resilient connection.

Dated the 5th day of April, 1923.

W. GRYLLS ADAMS,
87, Victoria Street, London, S.W. 1,
Chartered Patent Agent.

PROVISIONAL SPECIFICATION.

No. 10,188, A.D. 1923.

Improvements in Apparatus for Converting Oscillating Motion into Intermittent Rotary Motion.

I, GEORGE CONSTANTINESCO, of "Carmen Sylva", Beechwood Avenue, Oatlands Park, Weybridge, in the County of Surrey, a subject of the King of Great Britain and Ireland, do hereby declare the nature of this invention to be as follows:—

The present invention relates to devices for converting an oscillating motion to an intermittent rotary motion in one direction.

The invention consists in such a device comprising a link carrying a driving pivot which is connected by two connecting rods with oscillating members carrying pawls, sliders or other ratchet devices acting on a rotor mounted in fixed bearings, the driving pivot being oscillated by a suitable driving member while the pawls or sliders are subjected to an external force, produced for example by springs or their equivalent attached to fixed external points, such forces exercising a torque on the rotor in a direction opposite to the direction of rotation of the rotor whether the rotor is at rest or in movement.

The invention further consists in providing means for reversing such forces, for example by a second set of springs acting on the ratchet devices or a second set of pawls and springs with means for putting either set of springs in operation or out of operation as desired, whereby reversal of the mechanism can be obtained.

The invention further consists in mounting the fixed pivot or pivots of the link or links connected to the driving pivot in half bearings so that motion in one direction or the other of the driving pivot is restrained according to the direction of rotation of the driven rotor.

The invention further consists in the application of the mechanism above described to apparatus for splitting an oscillating motion into two components, one of which operates a rotor while the other causes the oscillation of a mass about a fixed pivot as described in my Patent Specification No. 185,022.

The invention further consists in the application of the mechanism above described for obtaining rotary motion from alternating movements derived from impulses produced by pneumatic, hydraulic, electric or other means in

cases in which no definite mean position about which the motion takes place would otherwise be obtained.

The invention further consists in the improved mechanism for converting oscillating motion to intermittent rotary motion hereinafter described.

In carrying the invention into effect according to one example, I provide a relatively short link, which I term a stabilising link, pivoted at a fixed point and carrying at its end a driving pivot which is oscillated by electric, pneumatic, hydraulic or other suitable means as shown in Patent Specification No. 185,022. The driving pivot is connected by two links to a pair of oscillating members carrying pawls, sliders or friction ratchet devices adapted to drive a rotor which rotates in a fixed bearing, alternately in the same direction. Any suitable form of ratchet, pawl, or a slider as shown in my Patent Specification No. 205,293, may be employed. Springs or their equivalent are provided, each spring being connected at one end to one of the pawls or sliders and at the other end to a fixed external point so that an external and independent torque in the opposite direction to the direction of rotation of the rotor always acts on the rotor owing to the external forces applied to the pawls or sliders. By this means the mean position of the apparatus is rendered stable. This results from the reaction due to such torque on the link. The necessary condition for stability is that the reaction of the torque on the link must be a tension force. It can be shown that for any position of the system away from its mean position, the driving pivot is subjected to a tangential force along the circle along which it must move on account of the stabilising link. Such tangential force is always in the direction in which it has the tendency to bring the stabilising link, and therefore the whole system, towards its mean position. In this example the mean position which the system takes automatically is such that the direction of the stabilising link must be at right angles to the line joining the driving pivot with the axis of the rotor.

If reversal of the rotor is desired, the ratchets may be made of the reversible type as described in my Patent Specification No. 205,293, or symmetrical pawls may be employed. In such reversing arrangement the fixed pivots of the link or links connected to the driving pivot should be mounted in half bearings as described in my Patent Specification No. 206,700, otherwise the mean position is not secured. This arrangement with half bearings is necessary in order to secure that the stabilising links are subjected only to forces tending to pull away from their fixed pivot and to destroy any compression forces which may occur in the stabilising link. The apparatus further may be applied to mechanism for driving a shaft against a variable resisting torque by splitting oscillating motion derived from a rotating crank between a rotor rotating intermittently in one direction and a mass oscillating about a mean position. Any suitable form of half bearing may be employed and any other arrangement equivalent to a link; for example; the driving pivot may be mounted on a block formed in two segments of a circle situated between corresponding circular surfaces and capable of oscillation in contact with either of these surfaces according to the direction of rotation required. To obviate friction in this form of the apparatus, the block may roll on fixed roller bearings, or if desired, the roller bearings may be mounted on the block.

Many devices may be employed to give the necessary freedom of motion of the pivot in one direction or the other, the essential condition for obtaining stability being that the motion of the driving pivot is on such a path that under the reaction produced on the track on which the block moves by the torque on the rotor, the various parts always tend to move towards a mean position in which they are stable. It should be noted that the stabilising forces on the system automatically increase in magnitude as the load on the rotor increases. At no load the only stabilising forces are those due to the external pull applied to the ratchets or the like as above described.

Dated the 14th day of April, 1923.

W. GRYLLS ADAMS,
87, Victoria Street, London, S.W. 1,
Chartered Patent Agent.

PROVISIONAL SPECIFICATION.

No. 18,057, A.D. 1923.

Improvements in or relating to Unidirectional Driving Mechanism.

I, GEORGE CONSTANTINESCO, of "Carmen Sylva", Beechwood Avenue, Oatlands Park, Weybridge, in the County of Surrey, a subject of the King of Great

Britain and Ireland, do hereby declare the nature of this invention to be as follows:—

The present invention relates to unidirectional driving devices in which a reciprocating or oscillating member drives a pair of ratchet devices moving in opposition and driving a rotor in one direction.

The invention consists in applying external forces to the sliders, pawls or the like in a double ratchet mechanism by the application of an almost constant force acting at one point of the apparatus.

The invention further consists in the improved means for applying a force to the ratchet devices in a double ratchet arrangement hereinafter described.

In carrying the invention into effect according to one example, two oscillating members are arranged to drive a rotor through two sliders of the type described in my Patent Specification No. 205,293, the two sliders working in opposition. The sliders are connected by links to the two arms of a shaft having two cranks or to a lever having two arms, the axis of the shaft being pivoted on a supporting link which is pivoted at a fixed point. The two cranks or the two arms of the lever are inclined to each other at a suitable angle and the shaft or lever is connected by a spring to a fixed point, for example, a rubber buffer or an hydraulic device or a very short spring may be employed exerting a substantially constant force on the pivot of the lever in one direction or the other, according to the direction of rotation of the apparatus described.

To obtain the best proportions for the apparatus, the links connecting the sliders to the cranks or arms of the lever should be tangential, one interior and the other exterior to the two circles described by their extremities respectively about the axis of rotation of the ratchet device and the axis of rotation of the shaft carrying the cranks, or the pivot of the lever.

In this manner for any symmetrical movement of the sliders in opposite directions, the cranks or levers will oscillate rigidly together about their axis of rotation which will remain practically stationary. The force applied to the shaft or lever is transmitted through the links to the sliders whether these are at rest or oscillating.

Dated the 12th day of July, 1923.

W. GRYLLS ADAMS,
87, Victoria Street, London, S.W. 1,
Chartered Patent Agent.

COMPLETE SPECIFICATION.

Improvements in or relating to Unidirectional Driving Mechanism.

I, GEORGE CONSTANTINESCO, of "Carmen Sylva", Beechwood Avenue, Oatlands Park, Weybridge, in the County of Surrey, a subject of the King of Great Britain and Ireland, 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:—

The present invention relates to clutches and unidirectional driving devices for various purposes, particularly to devices for converting an oscillating motion to an intermittent rotary motion in one direction.

The invention is applicable to many types of ratchet devices particularly to such devices as are described in my Patent Specification No. 205,293.

In the said specification I have described a clutch comprising a sliding member situated between an oscillating member and a rotating member and arranged so that relative movement of rotation between said sliding member and said oscillating member causes a movement of said sliding member at right angles to the movement of rotation with consequent engagement and jamming together of the three members, said sliding member having teeth or the equivalent on one side and smaller teeth or a friction surface on the other side brought into close engagement by the movement of said sliding member at right angles to the direction of rotation. In such device unless the clearance between the friction surface and the slider is extremely small in the free position there is a certain relative movement between the oscillating member and the slider which gives rise to shocks when the slider overruns the oscillator at the end of the driving stroke and if a rubber or other pad is employed as the friction surface, this relative movement increases as the pad becomes worn, so that the gear is apt to become noisy owing to shocks produced when the slider overtakes the oscillator.

The invention is also applicable to other types of ratchet devices and particularly to ratchets which are employed in combinations in which it is desired to maintain a definite mean position of the oscillating parts when there is no torque to be overcome at the driven shaft.

I am aware that it has previously been proposed to provide springs acting on sliding members used as intermediate members in clutches, but such springs have always been arranged so that they apply an internal force between the pawls and oscillators or between the pawls and the rotor. In such case, there is no resultant torque on the rotor and arrangements of this type cannot be made use of for stabilising purposes in systems which have no definite mean position when only a small torque is being transmitted.

The invention consists in a ratchet mechanism in which the pawl, slider or the like which acts on the rotor is subjected to a permanent force produced, for example, by a spring and acting towards a fixed external point.

The invention also consists in interconnecting the pawls, sliders or the like through balanced gears in two phase or polyphase operating undirectional devices so that the sliders drive each other through a suitable linkage anchored to an external point so that an external force may be applied to the balanced gear.

The invention further consists in providing means whereby the mechanism can be reversed so as to produce rotation of the driven rotor in either direction as desired.

The invention also consists in such a device comprising a stabilising link carrying a driving pivot which is connected by two connecting rods with oscillating members carrying pawls, sliders or other ratchet devices acting on a rotor mounted in fixed bearings, the driving pivot being oscillated by a suitable driving member while the pawls or sliders are subjected to an external force produced for example, by springs or their equivalent attached to fixed external points, such forces exercising a torque on the rotor in a direction opposite to that direction of rotation of the rotor whether the rotor is at rest or in movement.

The invention further consists in mounting the fixed pivot or pivots of the link or links connected to the driving pivot in half bearings so that motion in one direction or the other of the driving pivot is restrained according to the direction of rotation of the driven rotor.

The invention also consists in providing means whereby the permanent force acting on the pawl, slider or other type of ratchet can be readily reversed so that when applied to a reversing clutch capable of driving in either direction, the direction of rotation of the rotor may be reversed by merely reversing the direction of action of the permanent force acting on the pawls.

The invention also consists in the application of mechanism comprising a pawl acted on by a permanent external force to apparatus for splitting an oscillating motion into two components, one of which operates a rotor while the other causes the oscillation of a mass about a fixed pivot.

The invention further consists in the application of the mechanism above described for obtaining rotary motion from alternating movements derived from impulses produced by pneumatic, hydraulic, electric or other means in cases in which no definite mean position about which the motion takes place would otherwise be obtained.

The invention further consists in the improved mechanism for converting oscillating motion into intermittent rotary motion hereinafter described.

Referring to the accompanying diagrammatic drawings :—

Figure 1 shows a diagrammatic form in which two pawls, sliders, ratchets, or like unidirectional devices are employed;

Figure 2 shows the application of the invention for maintaining the mean position of oscillating parts in an apparatus actuated by means of an ordinary hydraulic device;

Figure 3 shows a diagrammatic arrangement in which the force acting on the pawls is obtained by means of fluid pressure produced by a centrifugal governor;

Figure 4 is a side elevation of an apparatus in which the invention is employed;

Figure 5 is a sectional view of the same, while

Figure 6 is a side elevation partly in section;

Figure 7 is a detailed view showing part of the reversing apparatus;

Figure 8 is a side elevation of the reversing apparatus, while,

Figure 9 is a plan of the same.

In the form of the invention shown in Figure 1, I provide a relatively short link *a* which I term a stabilising link, pivoted at a fixed point *b* and carrying at its end a driving pivot *c* which is oscillated by a link *d* connected at a common point *e* to a driving link *f* and a link *g* pivoted at a fixed point *h*. Motion is applied to the link *f* by the crank *k* on the driving shaft *l*. The pivot *c* is connected by a connecting rod with an oscillating member *n* carrying a pawl or other ratchet device *o* which acts on the rotor *p* pivoted on a fixed axis *r*. The pawl is connected to a fixed point *s* by a spring connection *t*. In this form of the invention as the crank *k* rotates the common

point *e* oscillates and transmits its motion to the pivot *c*, which, owing to the relative position of the fixed pivot, causes the oscillating member *n* to oscillate at double the frequency of the pivot *e*. In consequence two impulses are given through the pawl *o* to the rotor *p* during each revolution of the driving crank *k*.

In the form of the invention shown diagrammatically in Figure 2, a driving shaft 40 is provided with cranks 41, 42, 180 degrees apart in phase. These cranks are connected to pistons 43, 44 operating in cylinders 45, 46 which are kept continually full of liquid through non-return valves 47, 48. The cylinders are connected by pipes 49, 50 to the opposite ends of a cylinder 51 in which there is provided a double acting piston 52 connected to a pivot 53. The pivot 53 is connected by a rod 54 to a pivot 55 at the free end of a stabilising link 56 which is pivoted at a fixed point 57. The pivot 55 is also connected by two connecting rods 56, 59 with oscillating members 60, 61 carrying ratchet devices 62, 63 restrained by springs 64, 65 connected to fixed points 66, 67, the ratchet devices being arranged so that they drive the rotor in one direction. By this arrangement the mean position of the piston 52 is maintained whether there is any load on the rotor 68 or not.

In the form of the invention shown in Figure 3, the oscillating driving pivot 71 is connected by rods 72, 73 to oscillating members 74, 75 carrying ratchet devices 76, 77, these ratchet devices being capable of acting in either direction. The ratchet devices are connected by links 78, 79 to the piston rods 80, 81 of pistons 82, 83 moving in cylinders 84, 85 which are interconnected by pipes 86, 87 and which are connected through a reversing valve 88 with a source of fluid pressure connected at 89 and an outlet for fluid 90. The fluid pressure applied to the inlet 89 may be obtained by means of a centrifugal governor of the type described in my Patent Specification No. 146,642, directly connected or driven by the driving shaft which transmits motion to the pivot 71, or by any source of fluid pressure controlled by the speed of the prime mover shaft.

In the apparatus described in the said specification, a liquid pressure is produced in a rotating annular chamber which is proportional to the square of the angular velocity of the rotating chamber in which the liquid is contained, so that when this annular chamber is driven by the driving shaft which transmits motion to the pivot 71, liquid pressure will be produced and may be applied at the inlet 89 so that it will act on the pistons 82, 83, the pressure being proportional to the square of the speed of the driving shaft. As the inertia effects are also proportional to the square of the speed of the driving shaft, an arrangement of this kind will ensure that the forces acting on the ratchet devices towards an external point are proportional to the inertia forces acting on the apparatus, so that the desired force may be caused to act on the ratchet devices at various speeds.

In this form of the invention, if desired, the permanent force exerted by the liquid pressure may be supplemented by spring pressure acting on the ratchet devices, the direction of the spring pressure being the same as that of the liquid pressure and always acting on the ratchet devices in the direction opposite to the direction of rotation of the rotor.

It will be seen that in this arrangement the force exerted on the pawls will vary in proportion to the speed of the prime mover, so that the increased inertia to be overcome at high speeds is automatically allowed for, the force exerted on the ratchet devices being only that which is necessary to obtain the correct functioning of the apparatus at any given speed.

In the form of the invention shown in Figures 4 to 9, the prime mover drives a main shaft 101 having an eccentric 102 driving on to the central pivots 103 of the floating lever 104 by means of the strap 105. The floating lever 104 is connected at its ends to a pair of links 106, 107 which are pivoted to levers 108, 109 whose upper ends have their movement restrained by stops 110, 111 one of these stops or the other coming into operation according to the direction of rotation of the driven rotor on the shaft 112. The levers 108, 109 are pivoted in the frame of the machine and one end of the floating lever 104 oscillates the lever 113 carrying at its ends inertia masses 114, 115 while the other end of the floating lever 104 is connected by links 116, 117 with a pair of oscillating members 118, 119 which act through sliding members 20, 21 having large teeth on one side and friction surfaces 22, 23 on the other side to grip rotary members 24, 25 on the driven shaft 112 alternately. Fixed on each sliding member there are provided lugs 120, 121 connected by rods 122, 123 with arms 26, 27 fixed on a shaft 124 which is pivoted on a link 125 capable of movement about a fixed pivot 126. Threaded through the link 125 there is provided an actuating rod 127 carrying flanges with buffers 128, 129 between them and the link 125. The rod 127 is

connected to an eccentric 130 on a shaft 131 pivoted in the frame of the machine and the handle 132 is provided on this shaft by which either one or the other of the buffers 128, 129 may be brought in contact with the link 125. By this means the pull in one direction or the other may be exerted on the two sliders so that by merely moving the handle 132, the direction of rotation may be reversed.

The operation of the unidirectional driving device is as described in my Patent Specification No. 205,293 and it will be seen that the two sliders 120, 121 are interconnected through the rods 123, 122 and the arms 26, 27 which are fixed to the shaft 124. Consequently when one slider is being driven by its oscillator the positive connection between the two sliders causes the other slider to be held in its inoperative position.

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. A ratchet or like mechanism in which the pawl, slider or the like which acts on the rotor is subjected to a permanent force acting towards an external point other than a point on the oscillator or the rotor.

2. In apparatus as claimed in Claim 1 means whereby the mechanism can be reversed so as to produce rotation of the driven member in either direction, as desired.

3. Apparatus according to Claim 1 in which the sliders or the like of a two-phase or polyphase acting uni-directional driving device are interconnected through suitable linkage anchored to an external point whereby an external force may be applied to the sliders; so that the slider which is driving the rotor positively holds the other slider in the inoperative position.

4. In apparatus according to Claim 1 means whereby the permanent force acting on the sliding members on other ratchet devices can be readily reversed so that when applied to a reversing clutch capable of driving in either direction, the direction of rotation of the rotor may be reversed by merely reversing the direction of action of the permanent force acting on the sliding members or other ratchet devices.

5. Apparatus according to Claim 1 applied to mechanism for splitting an oscillating motion into two components, one of which operates a rotor, while the other causes the oscillation of a mass about a fixed pivot.

6. The improved mechanism for converting oscillating motion into intermittent rotary motion hereinbefore described and illustrated at Figure 1 of the accompanying drawings.

7. The improved mechanism for converting oscillating motion into intermittent rotary motion hereinbefore described and illustrated at Figure 2 of the accompanying drawings.

8. The improved mechanism for converting oscillating motion into intermittent rotary motion hereinbefore described and illustrated at Figure 3 of the accompanying drawings.

9. The improved mechanism for converting oscillating motion into intermittent rotary motion hereinbefore described and illustrated at Figures 4 to 8 of the accompanying drawings.

Dated the 5th day of February, 1924.

W. GRYLLS ADAMS,
87, Victoria Street, London, S.W. 1,
Chartered Patent Agent.

Hereford: Printed for His Majesty's Stationery Office, by The Hereford Times Ltd.
[Wt. 21A—125/6/1925.]

ERRATUM.

SPECIFICATION No. 217,684.

Page 5, line 52, *for* "motion in" *read* "motion is"

PATENT OFFICE,

November 6th, 1925.

2nd Edition

FIG. 1.

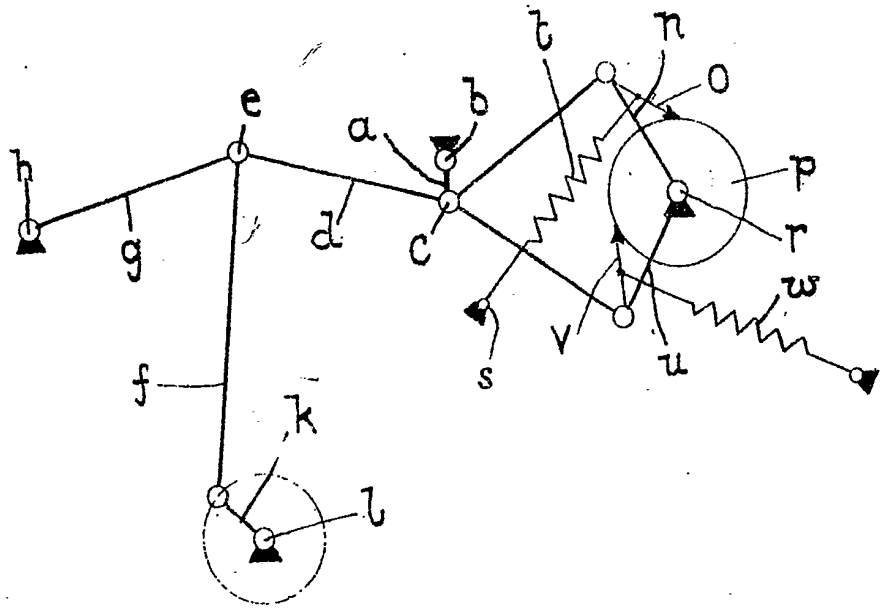
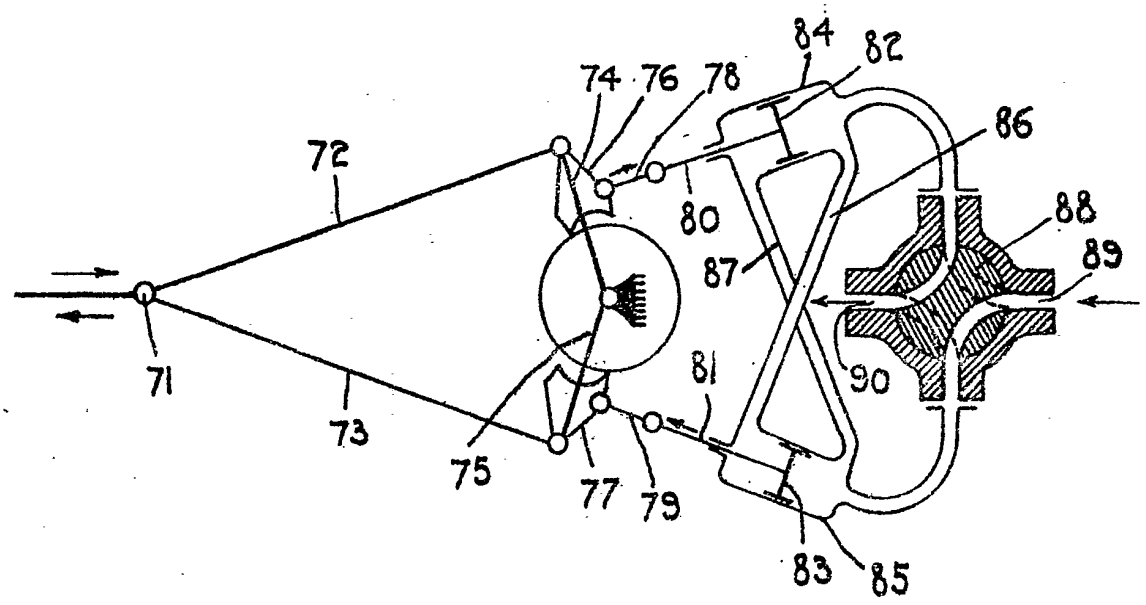
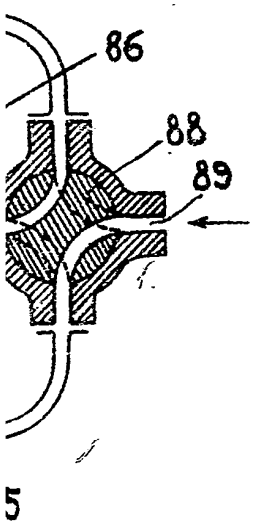


FIG. 3.





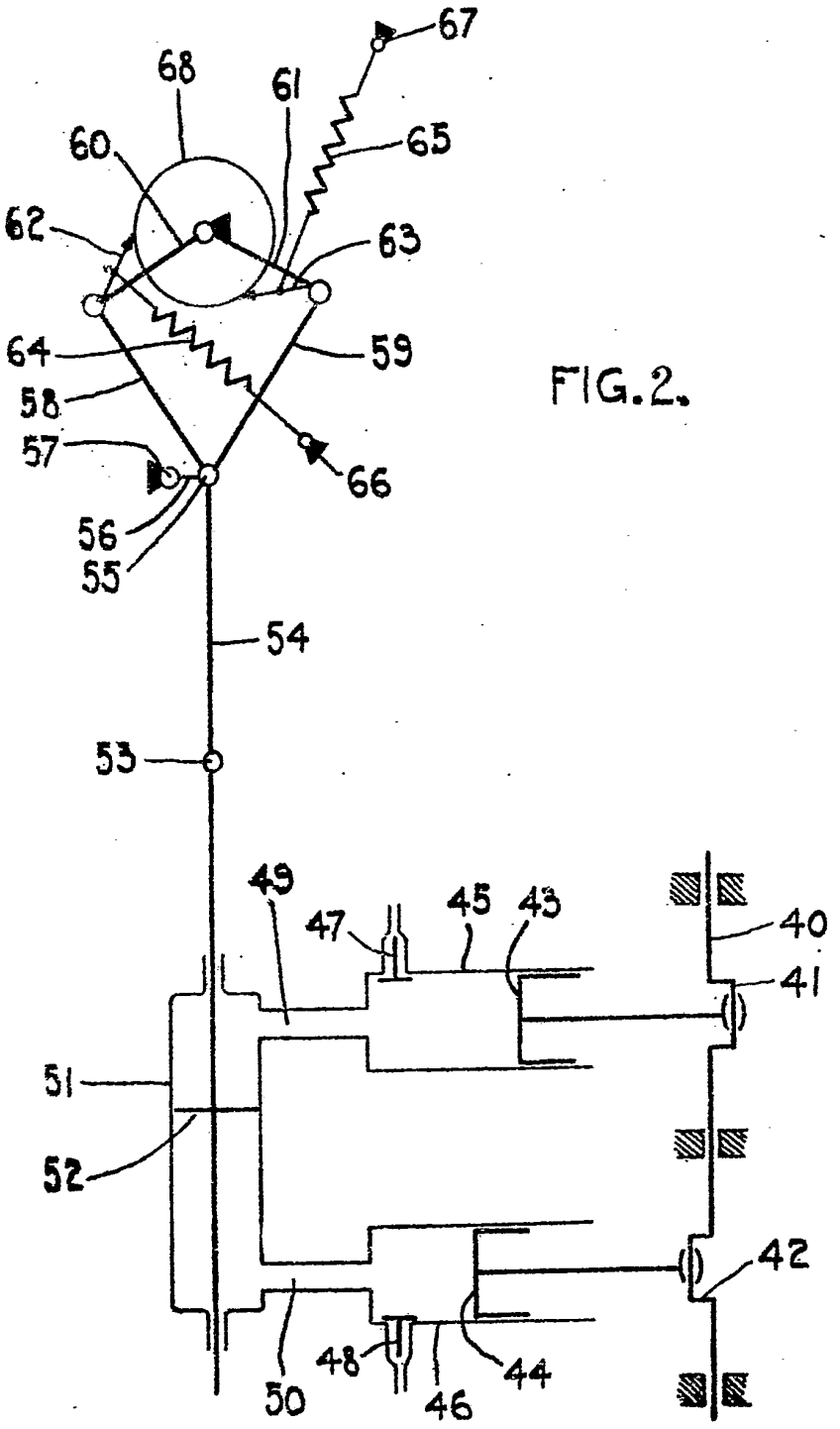


FIG. 2.

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SHEET 1

FIG. 1.

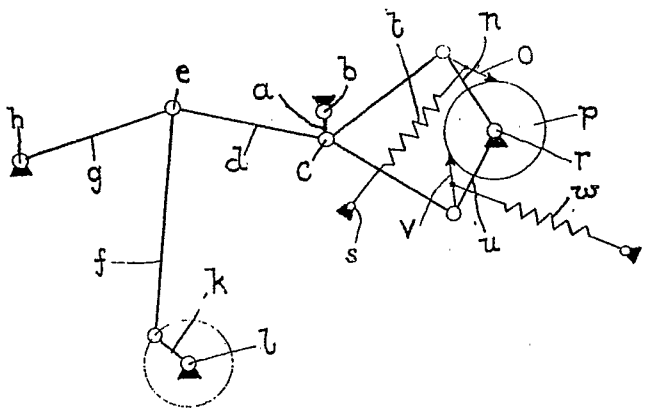
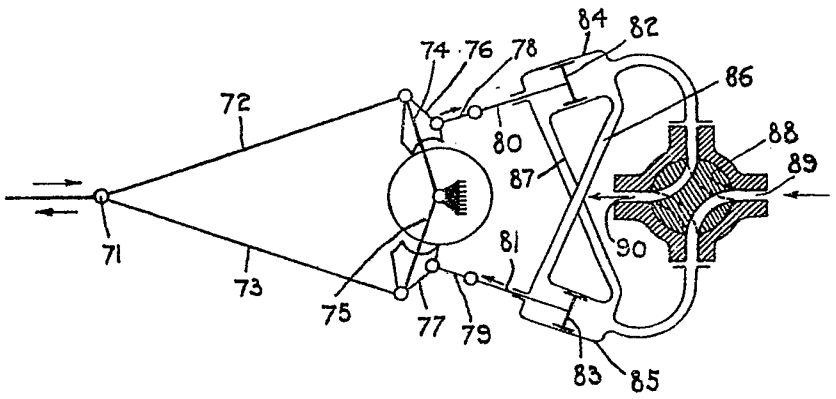


FIG. 3.



SHEET 2

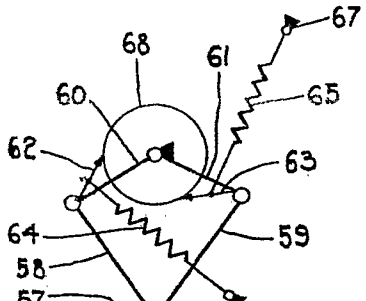


FIG. 2.

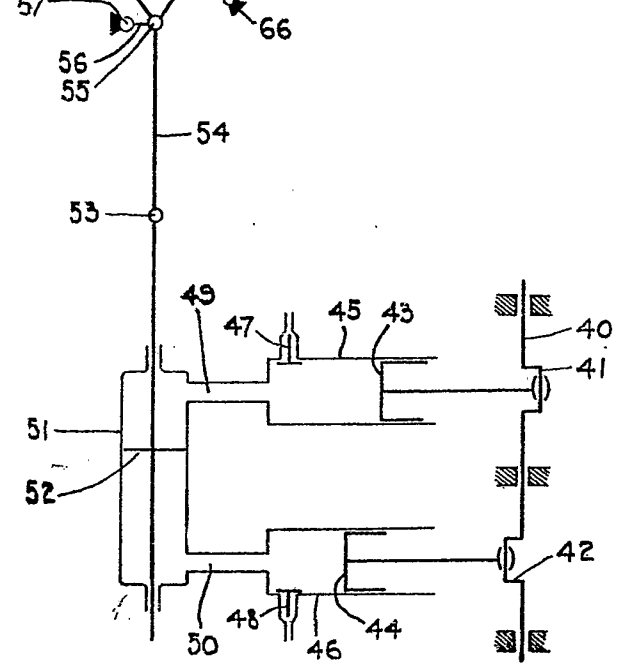


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Fig. 4.

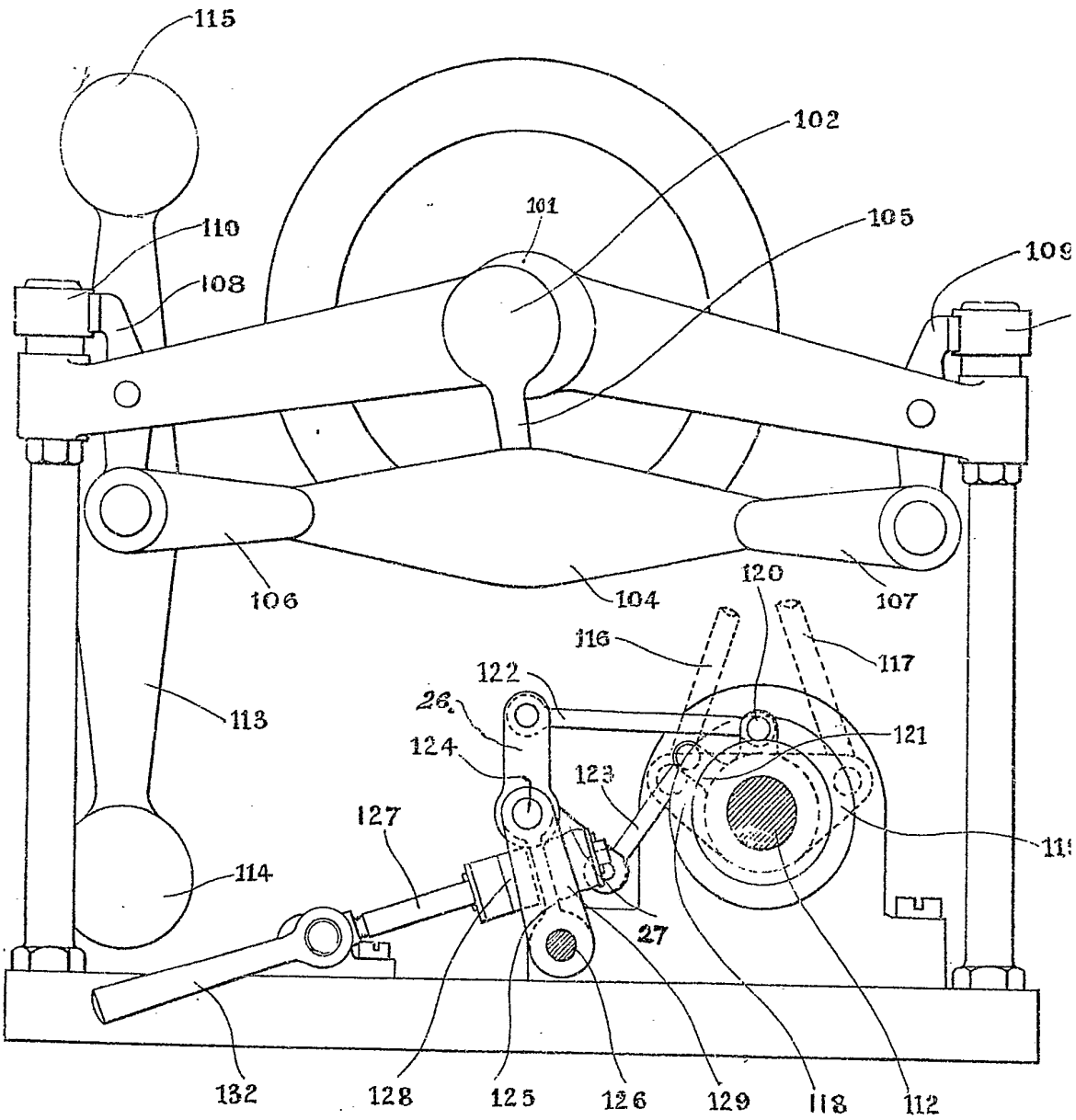

Fig. 5.

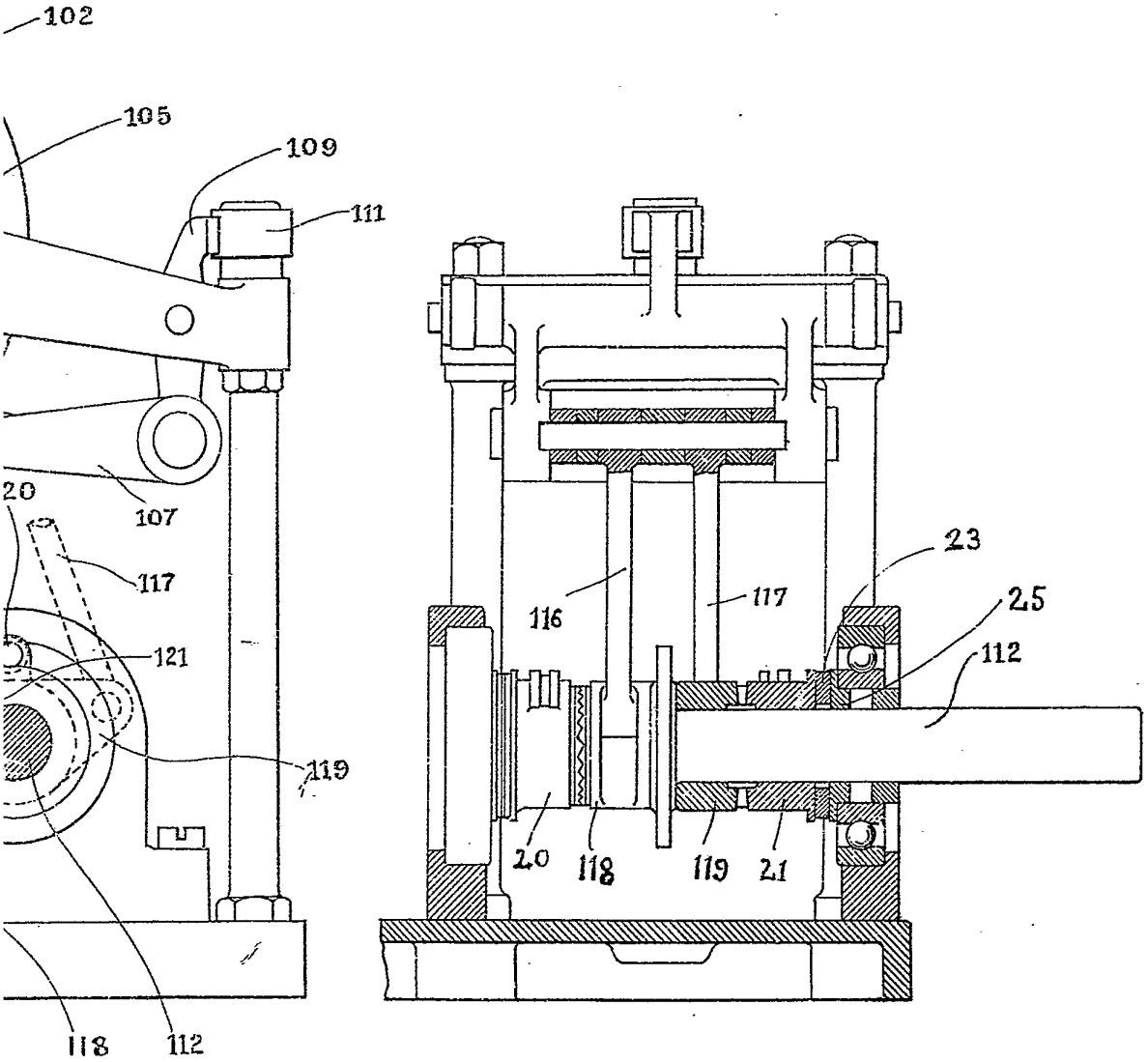

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Fig. 4.

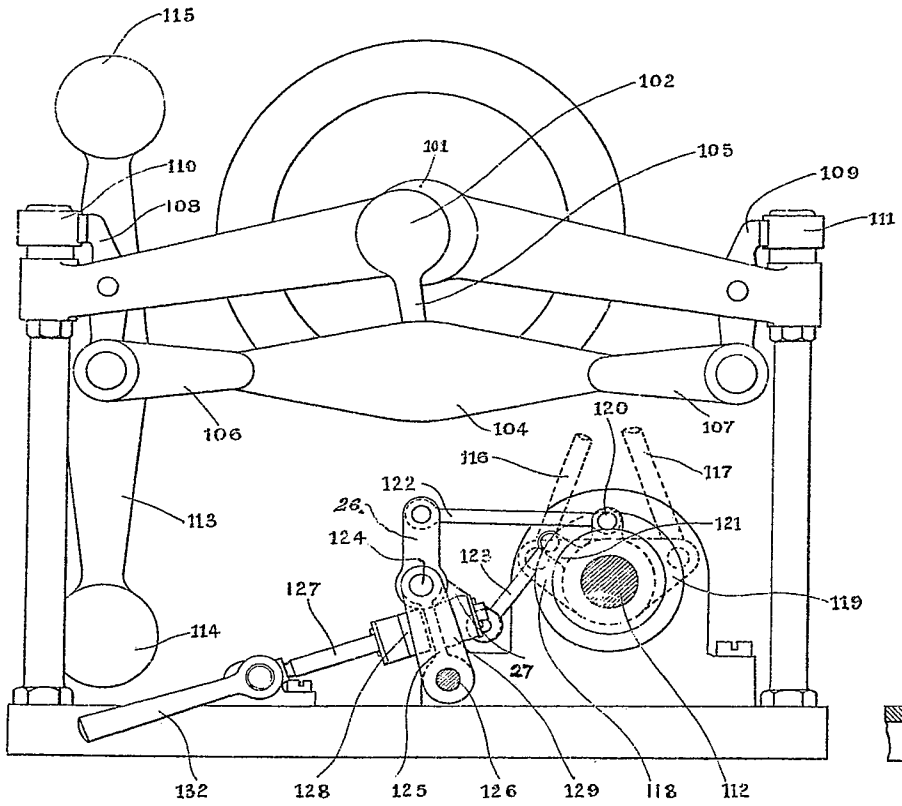
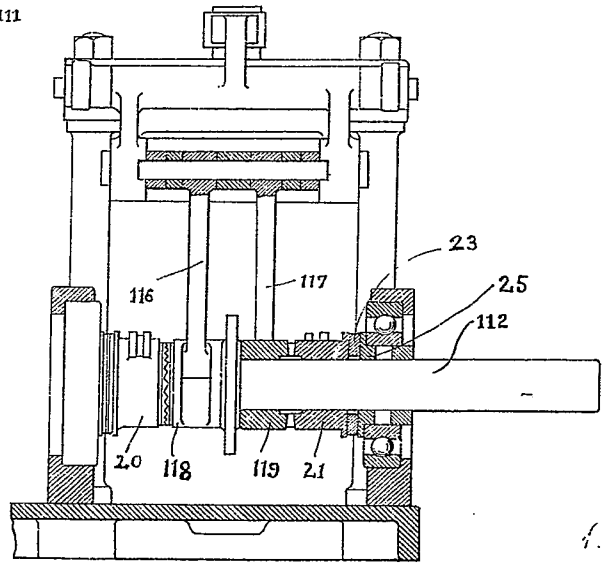


Fig. 5.



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

Fig. 6.

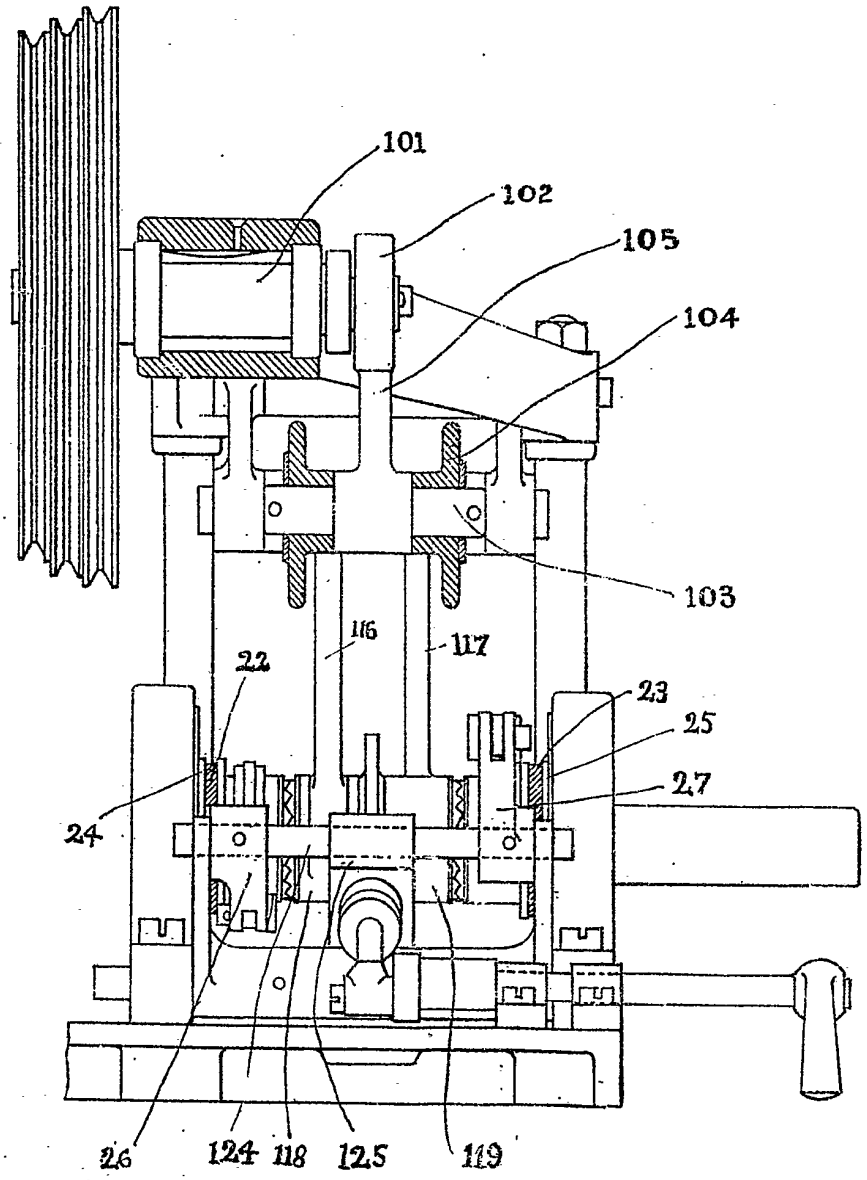

Fig.7.

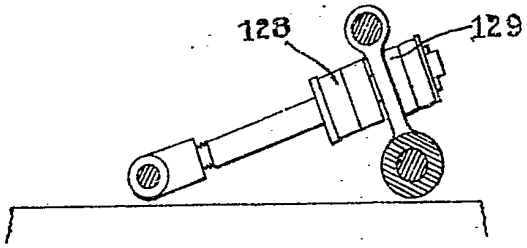

Fig.8.

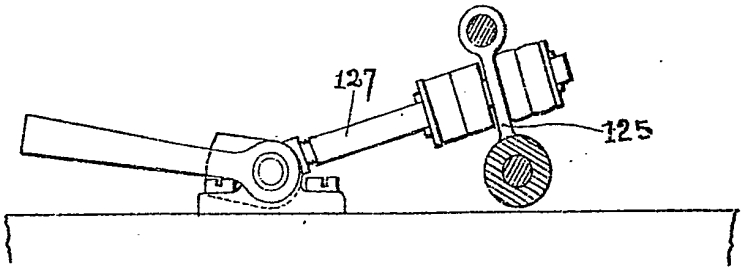

Fig.9.

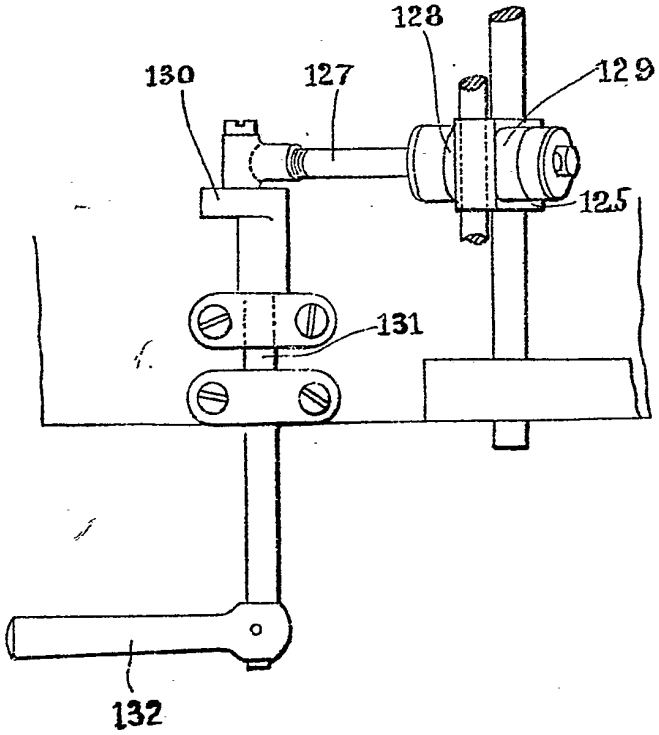

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Fig.6.

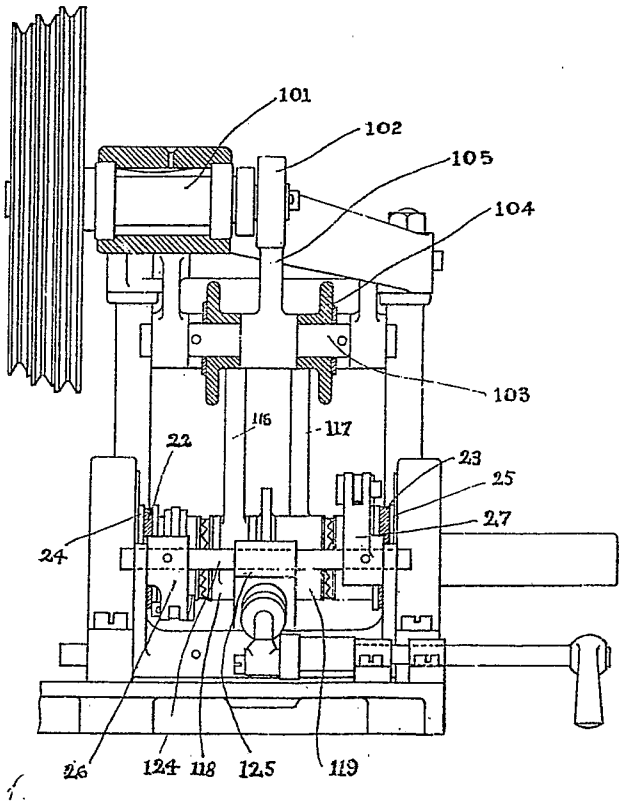


Fig.7.

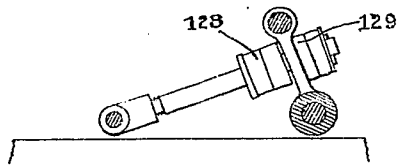


Fig.8.

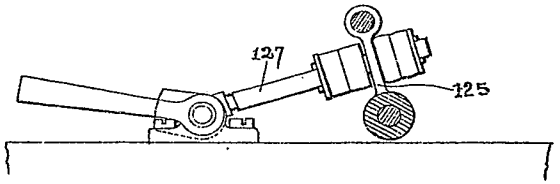
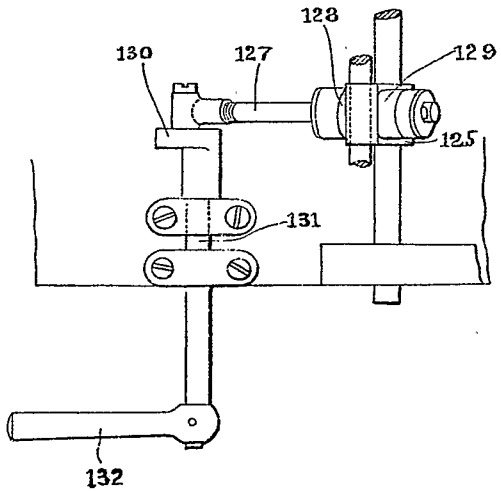


Fig.9.



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