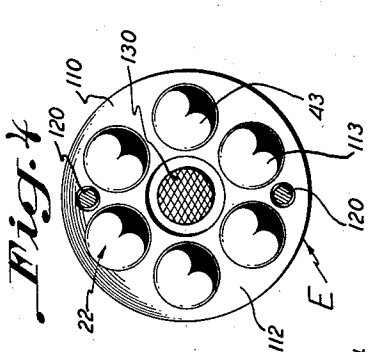
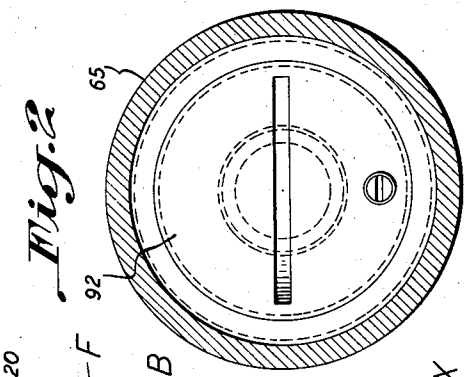
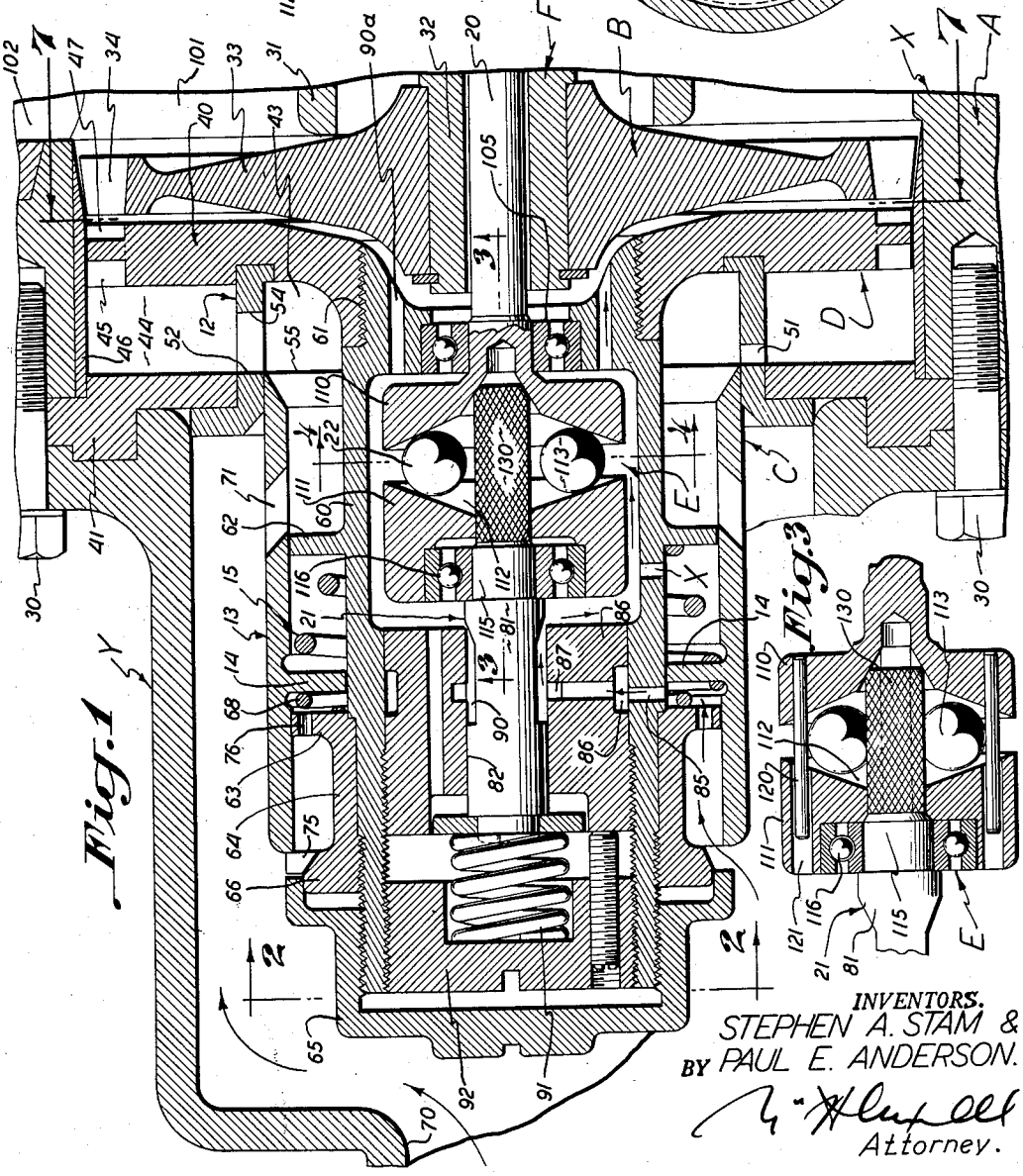
Aug. 12, 1958 P. E. ANDERSON ET AL 2,847,020

CONTROL MECHANISM

Filed Jan. 12, 1953 3 Sheets-Sheet 1







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CONTROL MECHANISM

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Fig. 5

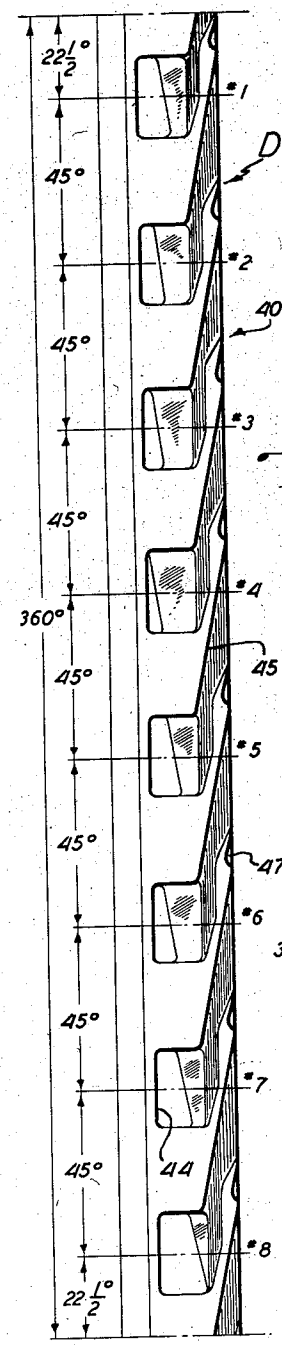


Fig. 7

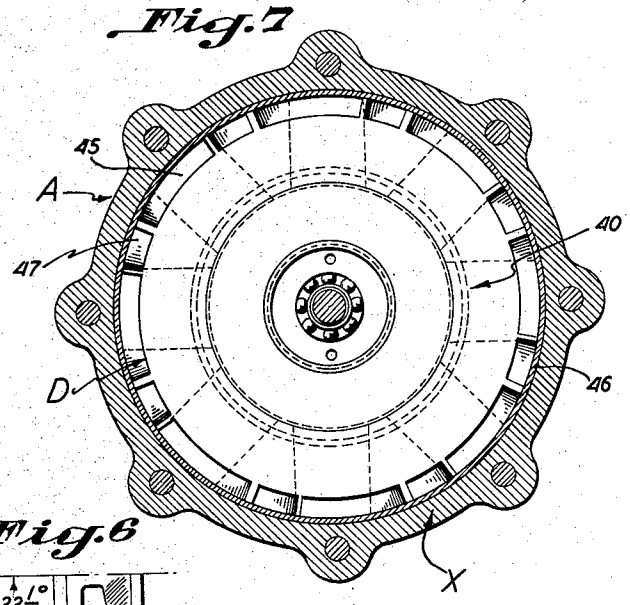


Fig. 6

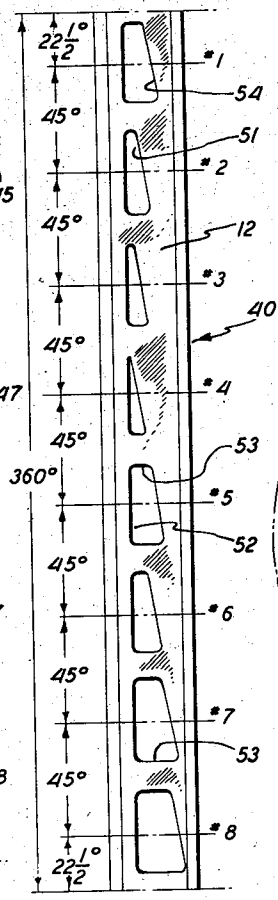
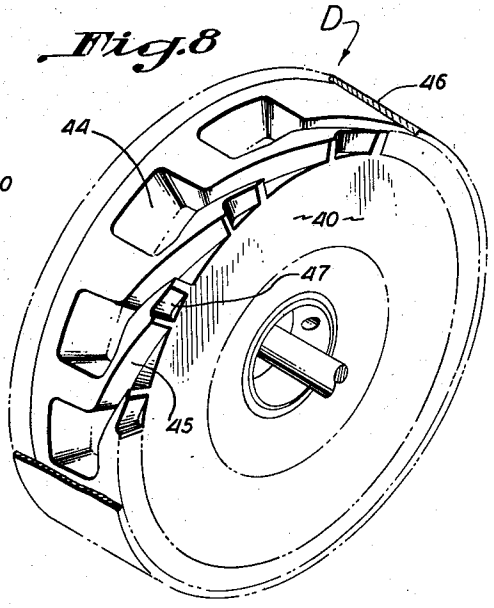


Fig. 8



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CONTROL MECHANISM

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Fig. 9

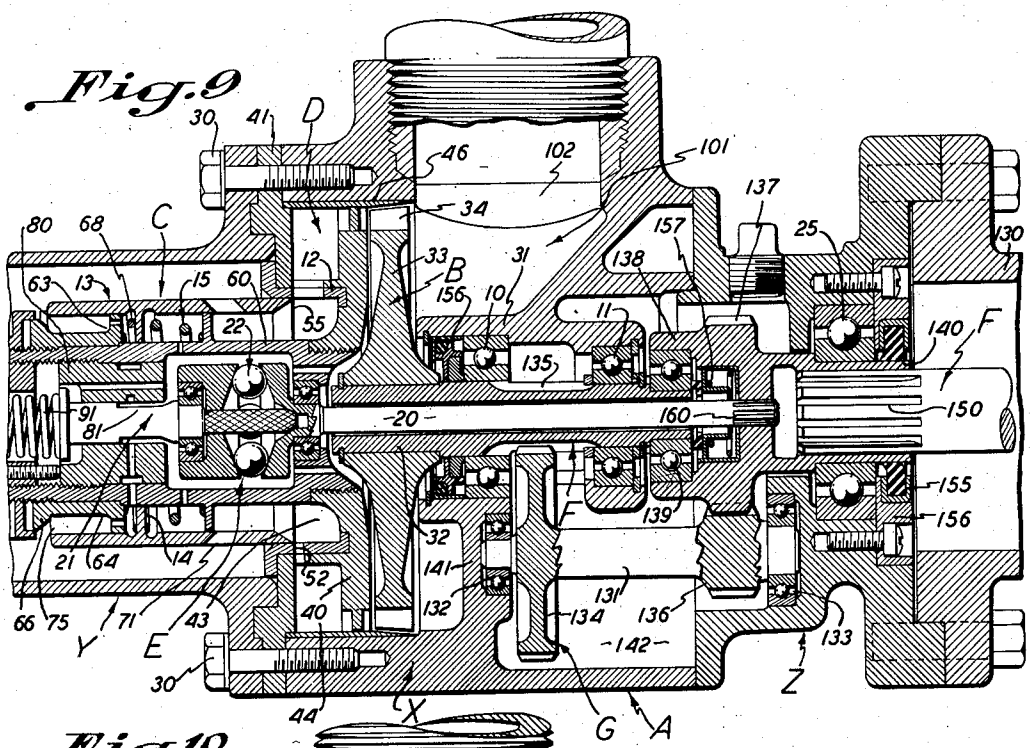
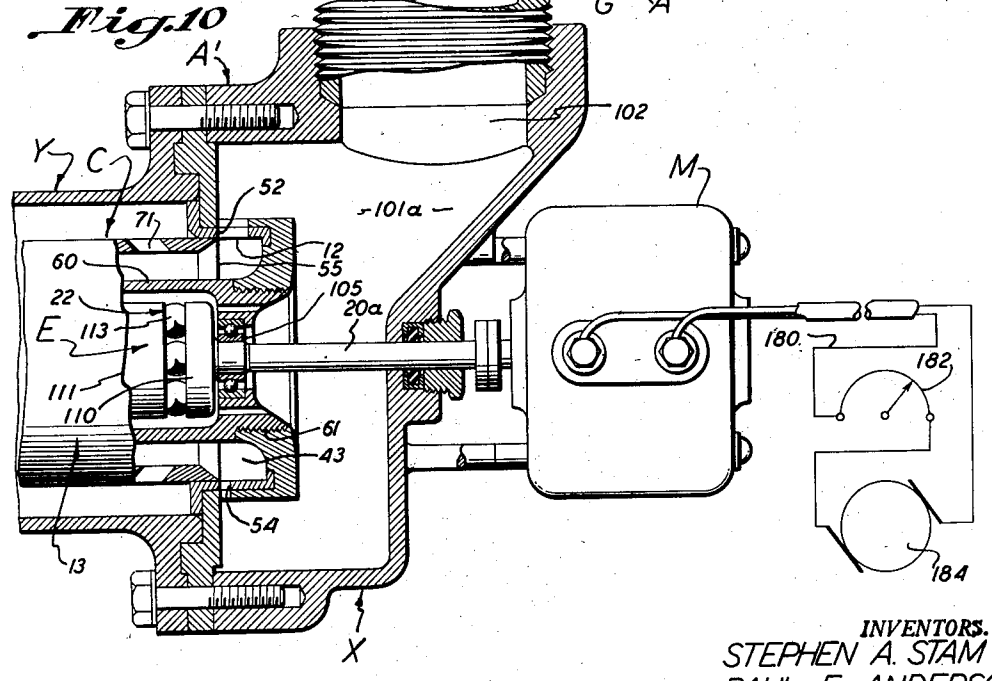


Fig. 10



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2,847,020

CONTROL MECHANISM

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Application January 12, 1953, Serial No. 330,822

7 Claims. (Cl. 137—36)

This invention has to do with a control mechanism and it is a general object of the invention to provide a simple, practical, improved control mechanism suitable for the handling or controlling of fluid and which is responsive to fluid pressure and also to speed.

It is a general object of this invention to provide a control mechanism providing for accurate or delicate control of flow and wherein thereis a primary control or regulating means in the nature of a sleeve type valve responsive to fluid pressure and a second, or modifying, control responsive to speed.

It is another object of this invention to provide a valve mechanism which is of such form and construction as to be practical in various machines or under various working conditions. In a typical situation the valve mechanism of the present invention can be used to advantage in a power generator as where the speed of a driven part is to be governed and where the valve of the control mechanism is responsive to fluid pressure while the final governing action is gained by means responsive to the speed of the driven element.

It is another object of this invention to provide a valve mechanism of the general character referred to including not only the control responsive to fluid pressure and the control responsive to speed but also having or including a prime mover, say for example an electric motor, by which the latter means is driven so that the speed factor is determined by the rate at which the prime mover is operated.

It is a further object of this invention to provide a valve mechanism of the general character referred to including a combination and arrangement of parts which results in a simple, compact, dependable mechanism which is effective and accurate in operation.

It is a further object of this invention to provide a valve mechanism of the general character referred to wherein the metering means is characterized by a sleeve-type valve, while the speed responsive means is such as to include a pressure relief valve located within the sleeve valve.

Another object of the invention is to provide a valve mechanism of the general character referred to wherein the sleeve valve of the meter incloses elements of the speed responsive means including a pressure relief valve and a means or mechanism adapted to be operated by, or which is responsive to, centrifugal force.

The mechanism provided by the present invention is characterized by a meter, preferably formed by an annular seat, with fluid passing orifices therein and a sleeve valve cooperating with the seat. A member is provided to operate the sleeve valve and is actuated by, or is responsive to fluid pressure, say for example the pressure of the fluid being handled by the valve. A speed responsive means is provided to vary or control the action of the meter and in a typical construction includes primarily a propeller shaft, a pressure controlling valve, say for example a relief valve controlling the pressure acting upon the pressure responsive means of the meter. A drive or coupling occurs between the propeller shaft and valve of the speed responsive means and includes an element adapted to be

operated by centrifugal force and serving to work the desired actuation of the valve of the speed responsive means. So far as the broader principles of the invention are concerned, the propeller shaft of the speed responsive means may be driven in any suitable manner and as an example in one situation it may be driven by structure actuated by or responsive to the fluid controlled by the throttle or, as is more specifically set forth in this application, it may be driven by a prime mover which is under control so that its speed of operation can be varied at will.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a longitudinal, central, detailed sectional view of a mechanism as provided by the present invention. Fig. 2 is a transverse sectional view taken as indicated by line 2—2 on Fig. 1. Fig. 3 is a view of a portion of the structure shown in Fig. 1 showing the parts in a different rotative position. Fig. 4 is a transverse sectional view of the parts shown in Fig. 3 being a view taken as indicated by line 4—4 on Fig. 3. Fig. 5 is a somewhat diagrammatic view or lay out of the peripheral portion of the plate element included in the throttle construction. Fig. 6 is a view of the type illustrated in Fig. 5, illustrating the seat element of the throttle. Fig. 7 is a reduced sectional view taken substantially as indicated by line 7—7 on Fig. 1. Fig. 8 is a perspective view illustrating a part of the mechanism and particularly the plate of the meter mechanism, the lay out of which is shown in Fig. 5 and showing this portion of the structure separate from the other parts. Fig. 9 is a reduced view including structure as illustrated in Fig. 1 and showing additional mechanism that may be incorporated in a carrying out of the invention where the speed responsive means is responsive to or driven by structure propelled by the fluid controlled by the meter and Fig. 10 is a view illustrating an embodiment of the invention wherein the speed of responsive means is responsive to or driven by a variable speed prime mover having no other connection with or relationship to the other parts of the structure.

Referring to the form of the invention illustrated in Figs. 1 to 9, it will be observed that the valve or control mechanism, as provided by the present invention, is incorporated in a machine which is essentially a power generating unit. This particular machine or generating unit is more specifically set forth, and is claimed in our copending application entitled "Fluid Driven Power Unit," filed on even date herewith Serial No. 330,821.

The mechanism embodying the present invention is shown as including generally a body A characterized by a middle or central section X, a forward or front end section Y and a rear end or shaft carrying section Z. A rotor B is mounted in the body A with its axis concentric with the longitudinal axis of the body. Bearings 10 and 11 support the rotor in the body A. The body section Y is at what will be termed the front or forward end of the structure and serves as a conductor of the fluid being handled.

The present invention provides a meter C adapted to control the fluid handled by the body and in the particular case under consideration the control C controls the flow of fluid to a flow directing or nozzle means D which serves to direct the fluid onto the rotor B to effect driving thereof. The meter C in the form illustrated is characterized by an annular seat 12 and by a sleeve valve 13 that cooperates with the seat. A fluid pressure actuated element, preferably a piston 14, is related to the valve 13 and is preferably carried by and located within the valve 13 and the pressure of the fluid handled by the body

section Y acts upon the piston **14**. A spring **15** is provided to normally yieldingly hold the valve **13** in an open position.

The present invention provides a speed responsive means E to control or regulate the action of the meter and in the form of the invention under consideration the means E includes a propeller shaft **20**, a fluid handling valve **21** in the nature of a pressure releasing valve and a coupling or operating means between the shaft **20** and the valve **21** characterized by one or more elements **22** adapted to be actuated by centrifugal force to effect operation of the valve **21**.

In the particular form of the invention under consideration the propeller shaft **20** of the structure as provided by the present invention is driven by or with the rotor B, actuated by the fluid controlled by the meter C. In the particular arrangement illustrated there is a driven shaft F supported by body section C through an antifriction bearing **25** and there is a drive means G connecting the rotor B and the shaft F. In the arrangement illustrated the propeller shaft **20** of the means D is connected or coupled to an element of the drive G so that the shaft **20** is driven in synchronism with the rotor B and the shaft F with the result that the speed of operation of these parts serves as or effects control of the meter C.

In the preferred construction the several sections X, Y and Z of body A are made separable to facilitate manufacture and assembly and they are shown as joined by suitable fasteners **30**.

The main or middle section X of body A is provided with or includes a central tubular core **31** that carries the bearings **10** and **11** supporting the rotor B.

The rotor B is located in the main or center section X of body A and is characterized by a tubular shaft **32** and a wheel **33** on the shaft **32** and provided at its periphery with blades **34**.

The wheel **33** is located on the forward end portion of rotor shaft **32** to be adjacent or immediately rearward of the nozzle means D which is carried by or located in the forward end portion of body section X. The nozzle means D is characterized by a plate **40** fixed in the forward end portion of body section X. The plate **40** has a supporting flange **41** arranged between opposed portions of the body sections X and Y and fasteners **30** join or connect these parts. The plate **40** is provided with a forwardly opening annular recess **43** and it has a plurality of radially disposed ports **44** outward of the recess. A plurality of notch like openings **45** are provided in the outer or peripheral portion of the plate **40** and these openings connect with the ports **44** and open at the rear side of plate **40**. The openings **45** are shaped or formed so that they establish nozzles that handle the fluid passed from the recess **43** to the ports **44**, and as will be noted from Fig. 8 of the drawings they may, in practice, be shaped and proportioned to be highly efficient or effective in directing the fluid to the blades **34** of the rotor so that the rotor is efficiently driven by the fluid. In the particular construction illustrated an annular member or liner **46** is carried in the forward end portion of the body section X so that it surrounds the peripheral portion of the plate **40** having the ports **44** and nozzle openings **45** therein. The liner, in effect, closes the outer ends of the ports and forms an outer wall for the nozzle openings **45**. In the arrangement illustrated there is a single nozzle opening **45** in communication with each radial port **44** and at the rear side of the plate **40** there are drag relieving recesses **47** between adjacent openings **45** as clearly illustrated in Fig. 8 of the drawings.

The meter or metering means as provided by the present invention may in practice vary widely in form and construction. In the case under consideration the means C is characterized by a sleeve type slide valve that is not affected by varying fluid pressure and the mechanism

includes the annular seat **12** which is shown carried by the plate **40** so that it occurs between the recess **43** in the plate and the port **44** in the plate. In the particular case illustrated the seat **12** has orifices provided in or through it, one opening into each port **44**, and the orifices vary in size or capacity. In the preferred form of construction each orifice has a forward wall **52** which is straight and disposed in a plane normal to the longitudinal axis of the structure, a rear wall **54** which is straight, but pitched or inclined relative to the plane just referred to and it has side walls **53** which are straight and parallel and which extend longitudinally or axially of the structure. The several front or forward walls **52** of the orifices **51** are in a single or common plane normal to the axis of the structure while the rear walls **54** of the orifices are spaced varying distances rearward of the walls **52** so that the orifices **51** are of different extents axially of the structure. In the particular case illustrated the side walls **53** of the several orifices are spaced equal distances apart so that all of the orifices are of the same size or extent circumferentially of the valve seat.

The valve **13** is a balanced valve and in the form under consideration is a sleeve valve and its rear end portion, which is its flow controlling portion, is slidably engaged in the annular valve seat **12**. The rear end **55** of the valve **13** is straight or in a plane normal to the longitudinal axis of the structure and when the valve is open the end **55** thereof is in line with the front walls **52** of the orifices **51** in the seat. The valve **13** is supported to slide or reciprocate and as it is operated or moved rearwardly the end **55** will move rearward in the seat **12** to cut down the effective size of the orifices **51** and will completely cut out or close the orifices one after another. When the valve has moved to an extreme rearward position it will have closed all of the orifices. In the form of the invention illustrated the valve **13** is supported by or from a forward extention **60** of the plate **40**. The extention **60** is illustrated as a separate or detachable part joined to the plate by threaded connection **61** and it is located centrally of the structure and extends into the valve **13** with substantial clearance. A rear radial flange **62** projects from the extension **60**, supporting the rear portion of valve **13** and a forward radial flange **63** projects from the extension **60** and supports the forward portion of the valve **13**. In the particular case illustrated the forward flange **63** is carried on a head **64** which is applied to the forward or terminal end portion of extension **60** where it is threaded onto the extension and set or locked by means of a retainer **65** threaded onto the extension **60** is a tubular element and the retainer **65** is in the nature of a cap closing the forward or terminal end of the extension. The head **64** is provided with a stop flange **66** which serves as a stop limiting forward movement of valve **13** and stops the valve in the open position as shown in Figure 1 of the drawing.

The fluid pressure actuated element of the meter C, which in this case is the piston **14**, is located in the valve **13** and is located between the valve supporting flanges **62** and **63**. The piston is rigid or fixed relative to the valve **13** and projects radially inward therefrom to slidably fit around the extension **60**.

The spring **15** provided to normally yieldingly hold the valve **13** open is preferably a helical spring surrounding extension **60** and located within the valve **13** between the flange **62** and the piston **14**. In the preferred construction a cushioning spring **68** is provided within the valve and around the extension **60** between the piston **14** and the flange **63**.

In accordance with the present invention fluid handled by the structure is admitted into body section Y as for instance through an inlet port **70** provided in the forward end of section Y. The fluid may be supplied to the structure from any suitable source as for instance by means of a suitable supply duct.

In accordance with the invention the fluid admitted into the body section Y is conducted through the body section and around the valve **13** to the gear end portion thereof where it is passed by ports **71** in the valve to enter into the rear end portion of the valve and to flow therefrom into the recess **43**.

In accordance with the invention the fluid being handled by body section Y is employed to actuate or operate the meter C so that the meter is responsive to fluid pressure and more specifically is responsive to the pressure of the fluid being handled by the meter. In the case illustrated the fluid being handled by the body section Y to be controlled by the valve **13** is admitted to the piston **14** to act thereon. In the case illustrated notch like ports **75** are provided in the stop flange **66** so that the fluid under pressure is admitted into the rear end portion of valve **13** and one or more ports **76** occur in the forward flange **63** so that the fluid under pressure is admitted between the flange **63** and the piston **14** to act on the piston and tend to force it rearwardly against the resistance of spring **15**.

Through the construction just described it will be apparent that as pressure increases on the fluid being handled by the body to be controlled by the valve **13** the piston **14** and, therefore, the valve **13** is moved or forced rearwardly against the resistance of spring **15** to close down or possibly completely close off one or more of the orifices **51** in the valve **12**.

The speed responsive means D provided by the present invention is such as to control or regulate the action of the meter C and in the form illustrated is characterized by a fluid controlling valve **21**, by a rotating element or propeller shaft **20** and a coupling or operating means between the shaft and valve characterized by one or more elements adapted to be actuated by centrifugal force and serving to operate the valve.

In the form of the invention under consideration the shaft **20** of the means D is located centrally of the structure and the valve **21** is located centrally of the structure and within the valve **13** of the throttle C. In fact, the valve **21** is located within the extension **60** which is the support for the valve **13**.

In the particular case illustrated the valve **21** is characterized by a seat member **80** located in the extension **60** and a reciprocating valve element **81** operating in the central opening or bore **82** extending through the seat element **80** longitudinally of the structure. The seat element is shown threaded into the extension **60** and the opening **82** provided in the seat element to carry the valve element **81** is in communication with the space or fluid carrying chamber **83** that occurs between the flange **63** and the piston **14**. In the case illustrated a lateral port **85** is provided in the extension communicating with the space between flange **63** and piston **14** and an annular recess **86** provided in the exterior of the valve member **80**. Radial ports **87** in the valve member connect the external recess **86** with an internal recess **87** which communicates with the opening **82**.

The valve element **81** has a stem portion slidable in the opening **82** and longitudinal fluid handling passages **90** in the exterior of the stem portion of the valve element are maintained in communication with the recess **87**. The passage **90** extends longitudinally of the valve element **81** to terminate so that when the valve is in a forward position the rear end of the passages occur within the opening **82** so that flow through the passages is stopped or cut off whereas when the valve element **81** is moved rearwardly the passages **90** will gradually uncover and consequently allow flow or escape of fluid from the passages at the rear of the valve element **81**.

A spring **91** is provided to normally yieldingly urge the valve element **81** rearwardly or to a full open position and in the case illustrated spring **91** is located between the forward to terminal end of the valve stem and a plug **92** threaded into the forward or terminal end of the extension **60**. From the foregoing description it will be apparent that the valve **21** is a lead or pressure release valve that is normally open. The valve **21** controls the flow or escape of fluid from the space or chamber occuring between flange **63** and piston **14** and as the fluid is passed by the valve **21** it flows forward through the extension **60** to discharge through ports **90a** in the forward end portion of the extension **60** to enter a chamber **101** in the main section X of the body A which chamber is in communication with an exhaust port **102**.

The shaft **20** in the form of the invention under consideration is located centrally of the structure and extends through the tubular shaft **32** of the rotor B. The shaft **20** projects forward from the rotor and its forward end portion is supported in an anti-friction bearing **105** located in the rear end portion of extension **60**.

The coupling or means connecting shaft **20** and valve **21** is located within the extension **60** so that it is likewise within the valve **13** and it is located rearward of the valve **21** so that it is between the valve **21** and the forward end of shaft **20**.

In the form of construction illustrated in the drawing the coupling between shaft **20** and valve **21** includes opposed plates **110** and **111** defining a chamber **112** in which one or more members **113** are located and are so carried as to be subject to or operated by centrifugal force. The plate **110** is carried on or fixed to the forward end of shaft **20** while the plate **111** is mounted on an extension or stem portion **115** of valve element **81** through an anti-friction bearing **116**. The plates **110** and **111** have opposed and spaced faces and in accordance with the present invention at least one of these faces is pitched or conical in form. In the case illustrated both of the opposed faces of the plates **110** and **111** are conical or pitched so that they define a chamber **112** which is outwardly convergent as clearly illustrated in Figs. 1 and 3 of the drawings.

The elements or members **113** adapted to be actuated by centrifugal force are preferably balls arranged in an annular series between the plates **110** and **111**. The balls are engaged with or confined between the opposed faces of the plates. The construction includes a drive means between the plates **110** and **111** and in the case illustrated this means includes drive arms **120** projecting forward from plate **110** to enter openings **121** provided in the plate **111**. This construction provides a drive between the plates so that the plates operate together or in synchronism and it allows for axial movement of the plate **111** relative to the plate **110**.

As the shaft **20** is rotated the plate **110** on the shaft **20** is likewise rotated and the plate **111** turns with the plate **110** because of the construction just described. As the structure rotates the balls **113** are acted upon by centrifugal force and move, or tend to move, outwardly. As this action occurs there is a wedging action tending to force the plate **111** forward relative to plate **110** and this forwardly acting force is opposed by the action of the spring **91** that normally tends to hold the valve **21** open. When the forward force created by centrifugal force is sufficient to overcome action of the spring **91** the valve element **81** is moved forward and if the centrifugal force is great enough the valve **81** may be moved forward to a position where the passages **90** are closed so that there is no flow or escape of fluid through the valve **21**.

In the construction illustrated a core **130** of a lubricant carrying material is located centrally in the mechanism just described and in practice the core **130** may be a body of felt or the like carrying a suitable lubricant and it may be carried by and between the plates **110** and **111** centrally of the mechanism as clearly illustrated in the drawings.

With the speed responsive means related to the throttle in the manner hereinabove described there is normally bleeding or escape of pressure that would tend to operate piston **14**; however, as the speed of the shaft **20** increases the bleeding or escape of pressure is retarded with the re-

sult that the pressure increases on piston **14** causing valve **13** to move rearwardly and thus cut down the flow occurring through the orifices of seat **12**. When the speed of the shaft **20** reaches a predetermined value there will be such operation of the structure as to cause choking of the fluid through valve **21** sufficient so that there is pressure on piston **14** enough to operate valve **13** so that the flow through the orifices of seat **12** is cut down to a predetermined value. In the particular case under consideration the shaft **20** of the speed responsive means is coupled to the rotor so that the action of the speed responsive means is such as to govern the throttle so that the rotor operates at a predetermined speed.

The bearing **25**, carried by section Z of body A, is an anti-friction bearing and rotatably supports the driven shaft F so that it is concentric with the longitudinal axis of the mechanism that is with the rotor and with the propeller shaft **20** of means E. The shaft F is shown projecting rearwardly from the body and into a housing **120** attached to the body A and projecting rearwardly therefrom.

The drive G provided for driving shaft F from the rotor B is shown as including a counter shaft **131** supported in the body A by anti-friction bearings **132** and **133**. The counter shaft **131** carries a gear **134** that meshes with a drive pinion formed by teeth **135** provided on the rotor shaft between bearings **10** and **11**. The gear **134** is substantially larger than the pinion formed by the teeth **135**. A pinion **136** is provided on the counter shaft **131** and meshes with and drives a driven gear **137** which is concentric with the shafts **20**, **32** and F. The gear **137** has a forwardly projecting annular flange **138** receiving an anti-friction bearing **139** carried on the rear end of the rotor shaft **32**. An extension **140** in the form of a sleeve projects rearwardly from gear **137** and extends between the bearing **25** and the forward end of shaft F. A driving connection is established between the gear part **140** and the shaft F by means of splines **150** on the engaged or overlapping parts.

The body section X is provided with walls **141** which define a chamber **142** housing parts such as the counter shaft and the gears and serving to carry a lubricant. In carrying out the invention it is preferred to provide a packing means or seal **155** between the retainer **156** that holds bearing **25** and the shaft F so that there is no leakage from the rear of the body around the shaft F. It is also preferred to provide a packing means **156** between the forward end of the tubular core **31** and the shaft **32** of the rotor. Further, a packing means **157** is provided between the gear **137** and the rear end of the rotor shaft. The means **157** seals the end of the tubular rotor shaft.

With a construction of the character just described it is advantageous to couple the propeller shaft of means E to a part such as the gear **137** so that the shaft **20** rotates at the same speed as the driven shaft F. In the case illustrated the rear end of the propeller shaft **20** is engaged with the gear **137** and a driving connection is established between these parts by means of splines **160**.

From the foregoing description it will be apparent that the valve mechanism provided by the present invention, which mechanism is characterized by the means C and E, operates so that it is responsive to the pressure of fluid handled by the body and also the speed of rotation of the shaft **20** which, in this case, is driven by the element operated by the fluid controlled by the valve mechanism. It will be apparent that the pressure on the fluid handled by the body will act on piston **14** of means C normally tending to close the valve **13** and as the speed of the propeller shaft increases the bleed valve **21** is closed so that by the time the shaft **21** reaches a predetermined speed the structure is set or regulated so that the right amount of fluid is passed by the valve **13** through the seat **12** to effect driving of the rotor B at the desired speed.

In the form of the invention illustrated in Fig. 10 the meter C and the means D may be substantially the same as hereinabove described. It is to be observed, however, that the shaft **20**–A of the speed responsive means is, in this case, in no way related to action resulting from the passage of fluid by the valve **13**. In this case the valve **13** passes the fluid directly into a chamber **101**–A provided in the body A' there being no rotor in the structure and no nozzle means D such as is present in the form of the invention first described.

In the form of the invention under consideration the propeller shaft **20**–A projects from the rear of the body A' and is adapted to be driven by a prime mover. In the drawings a motor M is shown directly applied to or coupled with the propeller shaft **20**–A and the motor is shown coupled in a control circuit carried by lines **180**. The circuit is shown as energized by a generator **184** and is shown as including a variable resistance or control **182**. The motor is a variable speed motor responsive to the control **182**. As a result of this arrangement and relationship of parts it will be apparent that the speed of the propeller shaft **20**–A may be varied as desired by actuating the control **182** and the action of the means D is thereby governed or subject to control to regulate or vary the manner in which the means D controls or varys the action of the meter C.

Having described only typical preferred forms of construction and typical manners of carrying out the method of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to our selves, variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described our invention, we claim:

1. A throttle valve mechanism for controlling the rotative speed of turbines and the like, including, a valve body adapted to receive the flow of fluid under pressure at one end thereof, a balanced sleeve type valve element shiftably carried in the body and urged toward a closed position in response to the pressure of the said fluid and adapted to deliver the flow of said fluid from the other end of the body, means normally yieldingly urging the valve element toward an open position, and a control adapted to vary the position of the valve element including, a pressure bleed valve adapted to vary the pressure of fluid acting on said valve element, a shaft adapted to be rotated by said turbine, and means connecting the shaft and the pressure bleed valve including a member rotated by the shaft and adapted to be operated by centrifugal force to operate the pressure bleed valve.

2. A throttle valve mechanism for controlling the flow of fluid under pressure to turbines and the like, including, an annular seat with a series of orifices therein, a balanced sleeve valve cooperatively related to the seat and adapted to progressively open and close said orifices and varying flow of fluid under pressure through the seat, means urging the sleeve valve toward an open position, a pressure responsive element actuated by the said fluid pressure and operating the sleeve valve toward a closed position, and a speed responsive means driven by the turbine and varying the pressure of fluid acting upon said element including a fluid controlling valve located within the sleeve valve.

3. A throttle valve mechanism for controlling the flow of fluid under pressure to turbines and the like, including, an annular seat with a series of orifices therein, a balanced sleeve valve cooperatively related to the seat and adapted to progressively open and close said orifices and varying flow of fluid under pressure through the seat, means urging the sleeve valve toward an open position, a pressure responsive element actuated by the said fluid pressure and operating the sleeve valve toward a closed position, and a speed responsive means driven by the turbine and varying the pressure of fluid acting upon said element including, a fluid controlling valve located within

the sleeve valve, and a means responsive to speed of rotation and operating the controlling valve and located within the sleeve valve.

4. A throttle valve mechanism for controlling the flow of fluid under pressure to turbines and the like, including, an annular seat with a series of orifices therein, a balanced sleeve valve cooperatively related to the seat and adapted to progressively open and close said orifices and varying flow of fluid under pressure through the seat, means urging the sleeve valve toward an open position, a member carrying the seat and extending into and supporting the sleeve valve, a pressure responsive element on the sleeve valve and actuated by the said fluid pressure and operating the sleeve valve toward a closed position, and a speed responsive means driven by the turbine and varying the pressure of fluid upon said element and including a pressure controlling valve within said member.

5. A throttle valve mechanism for controlling the flow of fluid under pressure to turbines and the like, including, an annular seat with a series of orifices therein, a balanced sleeve valve cooperatively related to the seat and adapted to progressively open and close said orifices and varying flow of fluid under pressure through the seat, a member carrying the seat and extending into and supporting the sleeve valve, a pressure responsive element on the sleeve valve and actuated by the said fluid pressure and operating the sleeve valve toward a closed position, and a speed responsive means driven by the turbine and varying the pressure of fluid upon said element and including, a pressure controlling valve within said member, and a speed responsive mechanism located within said member and operating the controlling valve.

6. A throttle valve mechanism adapted to control the flow of fluid under pressure from a single stream of fluid to individual fluid handling ports delivering separate streams of fluid to a turbine, including, an annular seat with a series of orifices therein and each orifice being related to and in communication with one of the said ports, an annular sleeve valve cooperatively related to the seat and adapted to open and close said orifices and controlling flow through the seat, a pressure responsive element on the sleeve actuated by the said fluid pressure to operate the sleeve valve toward a closed position, means urging the sleeve valve toward an open position, and speed responsive means driven by the turbine and varying the pressure of the actuating fluid against the element on the sleeve, the orifices being varied whereby they are opened and closed progressively as the sleeve valve is operated.

7. A throttle valve mechanism adapted to control the flow of fluid under pressure from a single stream of fluid to individual fluid handling ports delivering separate streams of fluid to a turbine, including, an annular seat with a series of orifices therein and each orifice being related to and in communication with one of the said ports, the orifices being in an annular series extending around the seat, an annular sleeve valve cooperatively related to the seat and movable axially of the seat and adapted to open and close said orifices to control flow of fluid through said orifices, a pressure responsive element on the sleeve actuated by the said fluid pressure to operate the sleeve valve toward a closed position, means urging the sleeve valve toward an open position, and speed responsive means driven by the turbine and varying the pressure of the actuating fluid against the element on the sleeve, the orifices being varied in extent axially of the seat whereby they are opened and closed separately and progressively as the sleeve valve is operated.

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