

No. 726,425.

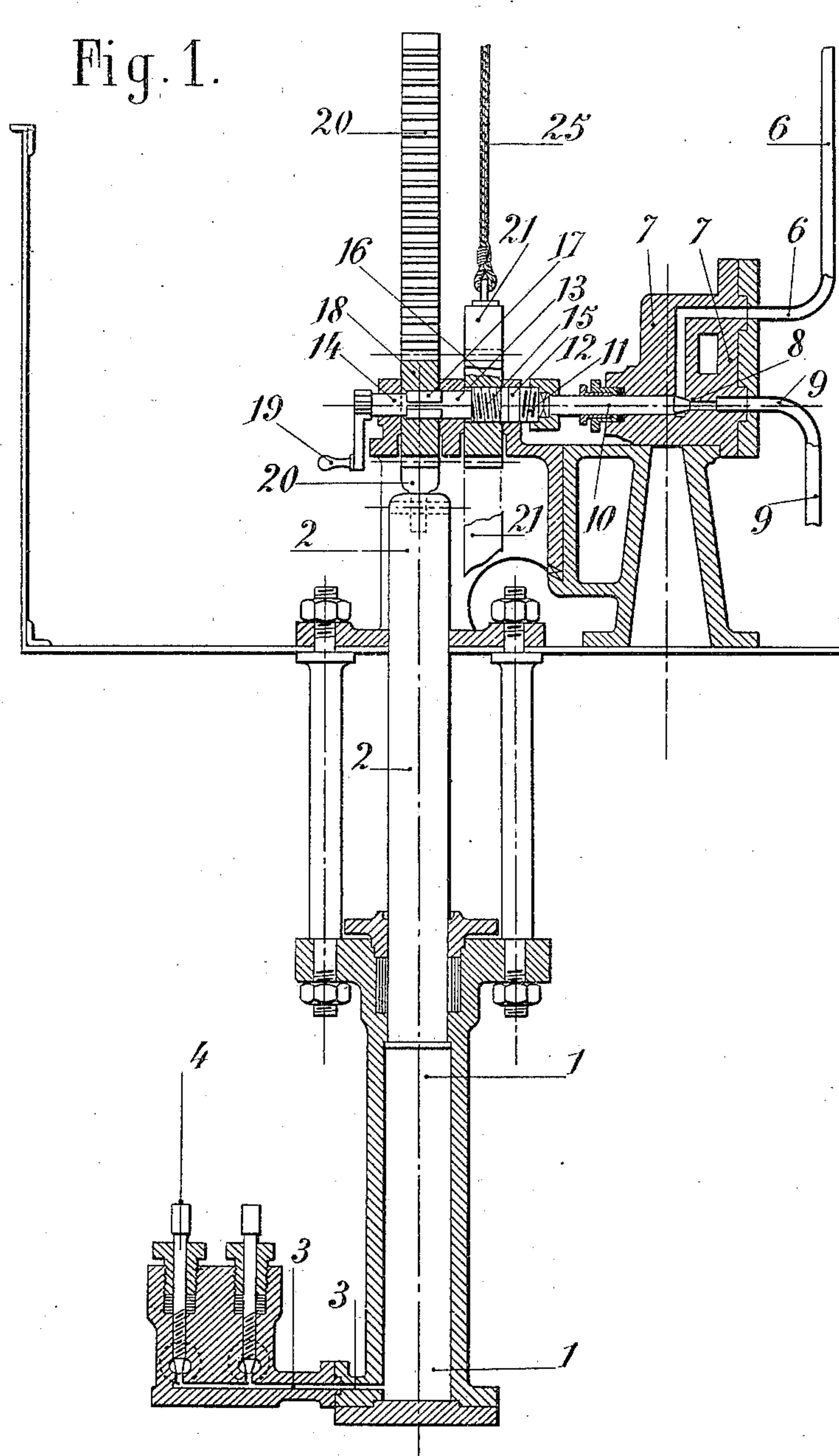
PATENTED APR. 28, 1903.

H. HARMET,
SPEED GOVERNOR FOR HYDRAULIC PRESSES.

APPLICATION FILED JULY 8, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
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Thomas M. Smith

Inventor:
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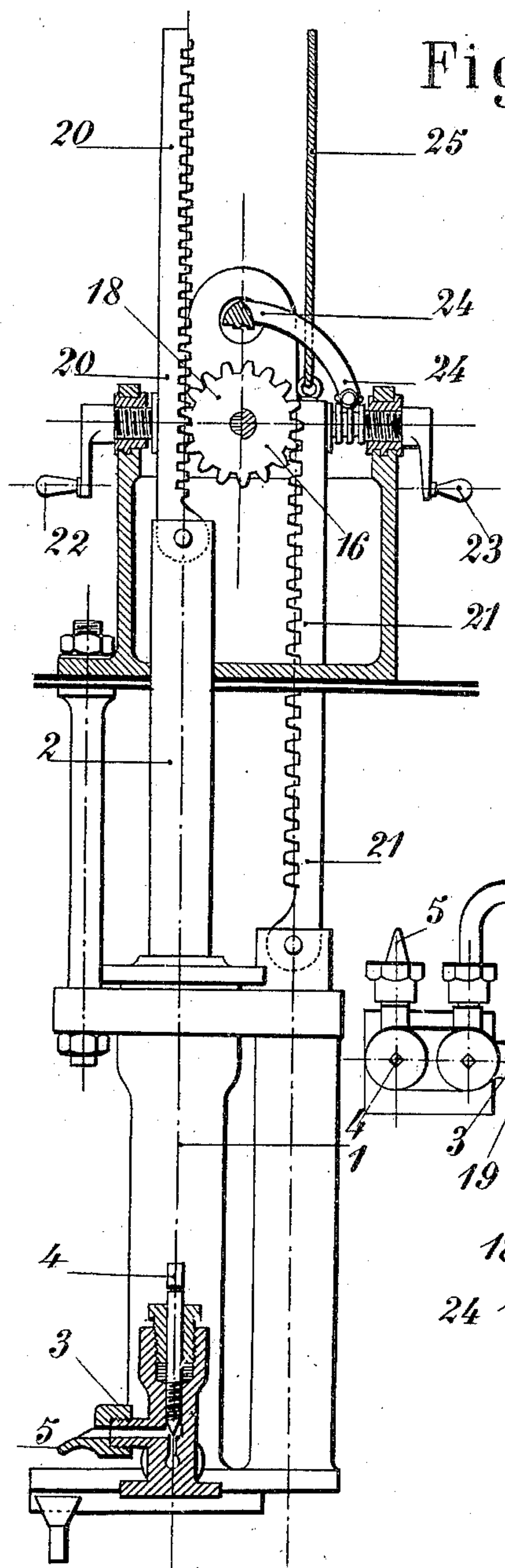


Fig. 3.

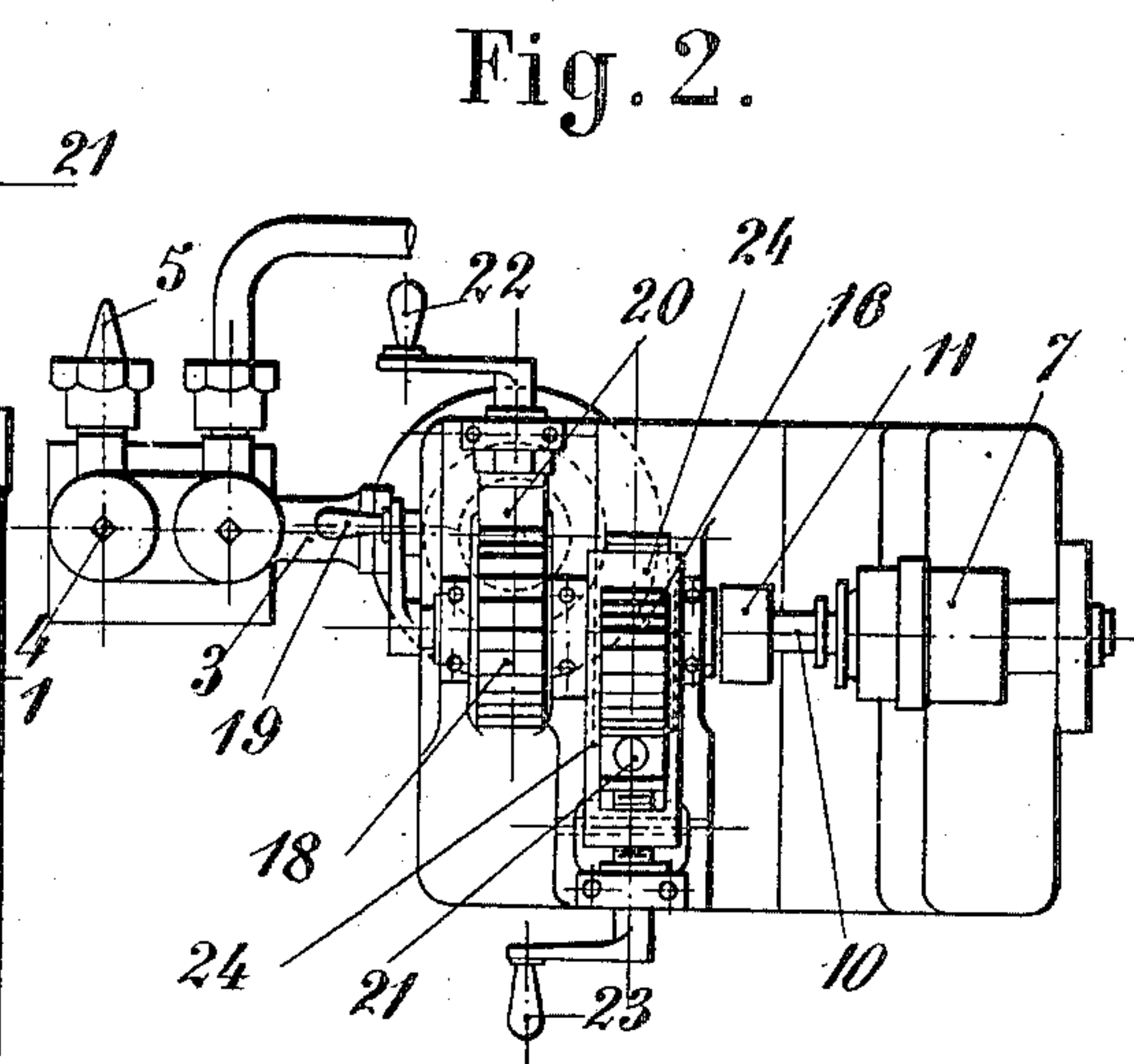


Fig. 2.

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UNITED STATES PATENT OFFICE.

HENRI HARMET, OF ST. ETIENNE, FRANCE.

SPEED-GOVERNOR FOR HYDRAULIC PRESSES.

SPECIFICATION forming part of Letters Patent No. 726,425, dated April 28, 1903.

Application filed July 8, 1902. Serial No. 114,759. (No model.)

To all whom it may concern:

Be it known that I, HENRI HARMET, a citizen of the Republic of France, residing at St. Etienne, Le Marais, Loire, France, have
5 invented a new and useful Improvement in Speed-Governors for Hydraulic Presses, more particularly applicable to metallurgy, which improvement is fully set forth in the following specification.

10 The process of compressing metal into conical ingot-molds proceeds satisfactorily when the upward speed of the press is continuously governed by hand by operating the valve admitting water; but when there are a great
15 number of ingots to compress in a short time or when very heavy ingots require compression for several hours there is great advantage in only starting the press by hand at the commencement of each operation and in governing automatically the speed of the press
20 in such a manner that, the speed remaining the same, the total travel necessary for compressing an ingot will be effected exactly in the period required. In order to regulate the
25 speed of the press according to the passage forward of the ingot and when once regulated to automatically keep the speed constant for as long as required, recourse must be had to an outside power capable when itself regulated of producing a constant effect. For this
30 purpose I make use of a weight which, exerting a pressure on water contained in a vessel, causes water to flow out of the vessel with a constant speed when the pressure and the
35 outlet-orifice remain constant. The arrangement is shown in the annexed drawings, in which—

40 Figure 1 is a sectional elevation of the arrangement. Fig. 2 is a plan. Fig. 3 is a side elevation.

1 is a cylinder supposed to be full of water or other fluid. If pressure be exerted upon the water by means of a ram 2, it tends to pass out from the cylinder through the pipe
45 3. If by means of a needle-valve 4 the small orifice 5, located at the end of the pipe 3, be opened, a flow of water takes place through the said orifice at a constant speed, and, if found necessary, drop by drop. The orifice
50 may be so regulated that the cylinder 1 empties itself in a predetermined time—one hour,

for example—the speed of flow always remaining constant.

The constant flow through the orifice 5 is utilized to obtain a constant upward speed in
55 the press in the following manner: 6 is the pipe coming from pumps and leading water under pressure into a distributing apparatus 7, from whence it passes out through the valve 8 and out through the pipe 9 into the
60 cylinder of the hydraulic press. It is not the flow of water through 6, 8, and 9 into the press which is desired to make constant, (for leaks in the piping or other causes might vary the quantity of water necessary,) but the up-
65 ward speed of the press, which is not the same thing.

The needle-valve 10, resting upon its seat 8, allows water under pressure to pass from
6 to 9 when it leaves its seat. The water
70 passes the more quickly the more it leaves its seat, and a method must be found of varying the lift or distance from its seat in such a manner that a constant upward movement of the press-ram results. For this object the
75 needle-valve 10 is prolonged at its rear end into a shaft, which has upon it successively: at 11 the connection of the valve and its prolongation, which leaves the shaft free to turn without moving the valve (properly so called) 10.
80 (The connection 11 may be of any suitable form, so as to permit the needle-valve 10 to be moved endwise by the screw-threaded shaft without rotating therewith. In the form illustrated in the drawings both the shaft and the
85 needle-valve 10 terminate at their adjacent ends in hardened wearing-plates which are pressed against each other by a nut firmly screwed to the end of the shaft.) At 12, 13, and 14 are rounded pieces which serve as
90 guides in their respective bearings; at 15 a screw-threaded portion rotating inside the pinion 16, which also carries a screw-thread and forms a nut; at 17 a square piece which passes into a square hole located at the center
95 of the pinion 18. 17 can slide axially inside the pinion; but when there is a rotary movement 17 and 18 rotate together, consequent upon their square shape.

19 is a crank-handle for moving the valve
100 10 by hand when the racks 20 and 21 are removed from their respective pinions 18 and

16. The rack 20 is pivoted in the upper end of the weighted piston or ram 2 and has no other means of guidance. It normally tends to fall back out of engagement with the pinion 18 by its own weight and is pressed by a
5 suitable screw-piece operated by the handle 22 against said pinion 18.

22 and 23 are crank-handles for putting the racks 20 and 21 into gear with their respective pinions 18 and 16 or, on the contrary, for putting them out of gear. When
10 by means of the crank-handle 23 the rack 21 is placed out of gear with pinion 16, this latter is transformed into a nut fixed by aid of the claw 24, which engages with its teeth.
15

The rack 21 tends to descend vertically by its weight, but the rope 25 holds it in the air and fixes it to the press-ram. (Not shown.) When the press-ram rises for the compression, 25 causes 21 to rise with a speed equal
20 to that of the press-ram and rotates the pinion 16.

The rack 20 in falling rotates the pinion 18 in the same direction as the rack 21 in rising
25 rotates the pinion 16. If the two racks move at the same speed, the pinions also move at the same speed.

The ram 2, which carries the rack 20, being at the top of its travel, if the needle-valve
30 4 be opened the water in the cylinder flows through 5 with a given speed. The ram 2 and the rack 20 then fall as the water flows out, rotating the pinion 18, and consequently the square piece 17 and the valve-shaft. The
35 press-ram being still motionless, the rope 25, the rack 21, and the pinion 16 are also motionless, the pinion 16 being thus kept motionless by the non-movement of the rack 21 becomes a nut for the screw-threaded portion
40 15 of the rotating shaft, which is thus forced by the fixed nut to move axially, drawing with it the needle 10, which comes off its seat 8, the water under pressure passing from the pipe 6 to the pipe 9 and into the press,
45 the ram of which rises. The ram of the press rising also causes the rope 25 and the rack 21 to rise and rotates 16 in the same direction as 18, which is rotated by the rack 20 and the ram 2. The rack 21 then rises with the
50 speed of the press-ram, and the rack 20 falls with the speed of the ram 2, which is constant, being governed by the needle 4.

If the racks 20 and 21 move at the same speed, the pinions 16 and 18 rotate at the
55 same speed in the same direction. The shaft of the valve also rotates, but without axial movement, and consequently the valve 10 remains stationary, water under pressure flowing with regularity through the seat 8 for
60 moving the press-ram.

If the rack 21 moves more quickly than the rack 20, the pinion 16 will rotate more quickly than the shaft and act as a nut upon the
65 screw-threaded portion and close the valve 10. If the rack 21 moves more slowly than the

rack 20, the pinion 16 will rotate more slowly than the shaft and act as a nut upon the screw-threaded portion in an opposite direction to the first case and opens the valve 10. The valve 10, therefore, is opened or closed
70 when the speed of the rack 21 is not equal to that of the rack 20. The speed of this latter being constant and the speed of the rack 21 being the same as that of the press-ram, it will be seen that the arrangement described
75 allows the upward speed of the press for compressing steel into a conical mold to be governed and maintained constant.

I have shown above the application of this method of governing presses for compressing
80 steel; but it is apparent that it is applicable to all other hydraulic presses.

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

1. In a speed-regulator for hydraulic presses, a valve governing the inlet of water to the press-cylinder, a shaft forming a continuation of the valve-stem and rotatable independently thereof, means for driving said
90 shaft at a constant speed, a governing-piece controlling said means, a second piece connected with and moving at the same speed as the press-ram, and means controlled by the
95 differential movement of the governing and second pieces, whereby when the ram and its piece move at a lower speed than the governing-piece, the valve-stem is retracted to move the valve from its seat, and when the ram
100 and its piece move at a higher speed than the governing-piece, the valve-stem is operated to move the valve toward its seat.

2. In a speed-regulator for hydraulic presses, a valve regulating the inlet of water
105 to the press-cylinder, a shaft forming a prolongation of the valve-stem and rotatable independently thereof, a pinion driving said shaft at a constant speed, a governing-piece controlling said pinion, said pinion keyed to
110 said shaft and sliding thereon, a screw-threaded portion formed on said shaft, a second pinion incapable of movement in the direction of its axis and engaging said screw-threaded
115 portion of said shaft, a rack driving said second pinion, and a press-ram operating said rack, all arranged so that when the press-ram, rack and second pinion move at a speed varying from the speed of the governing-piece
120 and its pinion, the shaft will be moved inwardly or outwardly in the first pinion to correspondingly control the regulating-valve.

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

HENRI HARMET.

Witnesses:

ANTOINE CROZIER,
HASWYN SUMNY.