No. 696,053. Patented Mar. 25, 1902.

O. KAMMERER.

ELECTRICAL PRESS.

(Application filed May 19, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

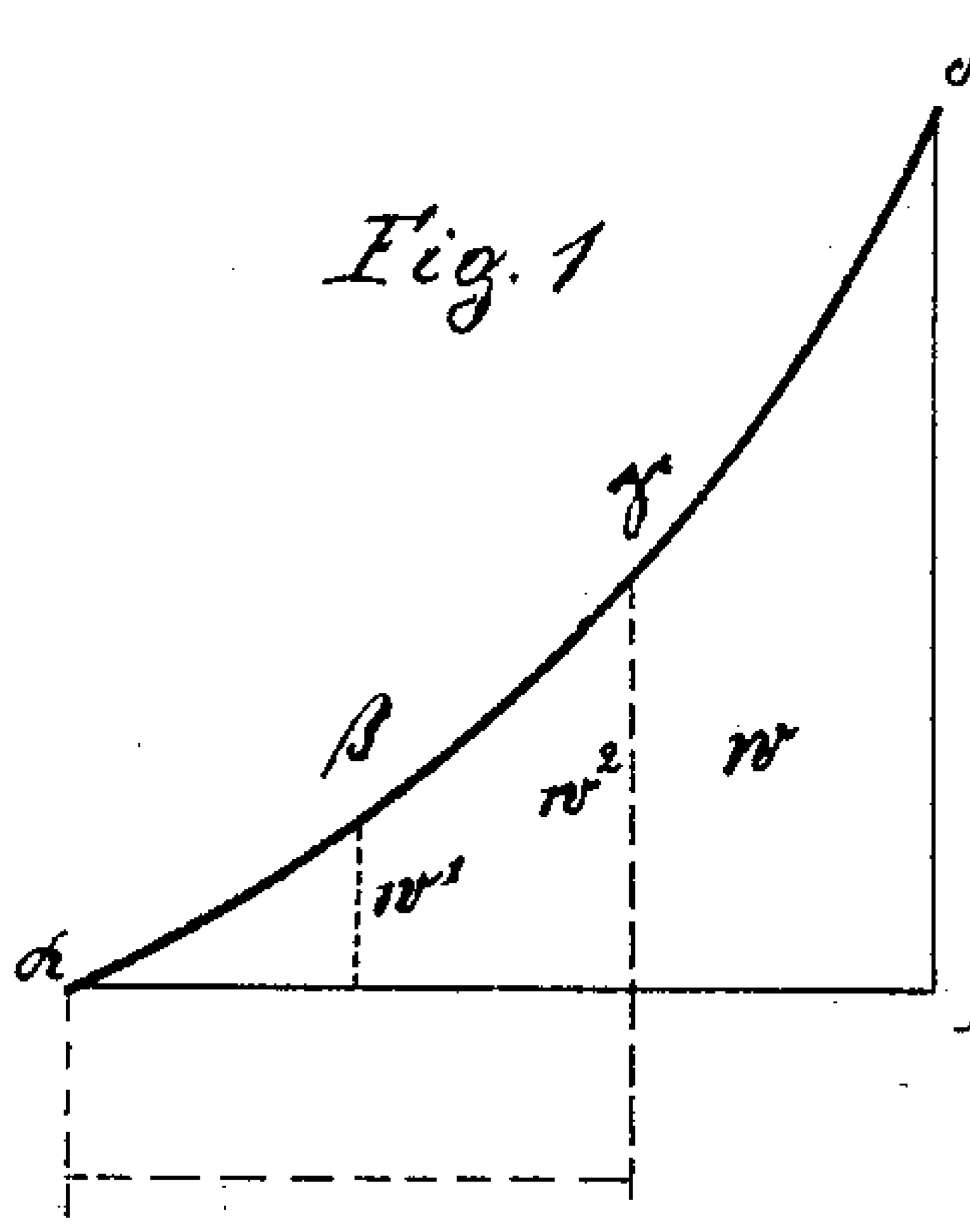
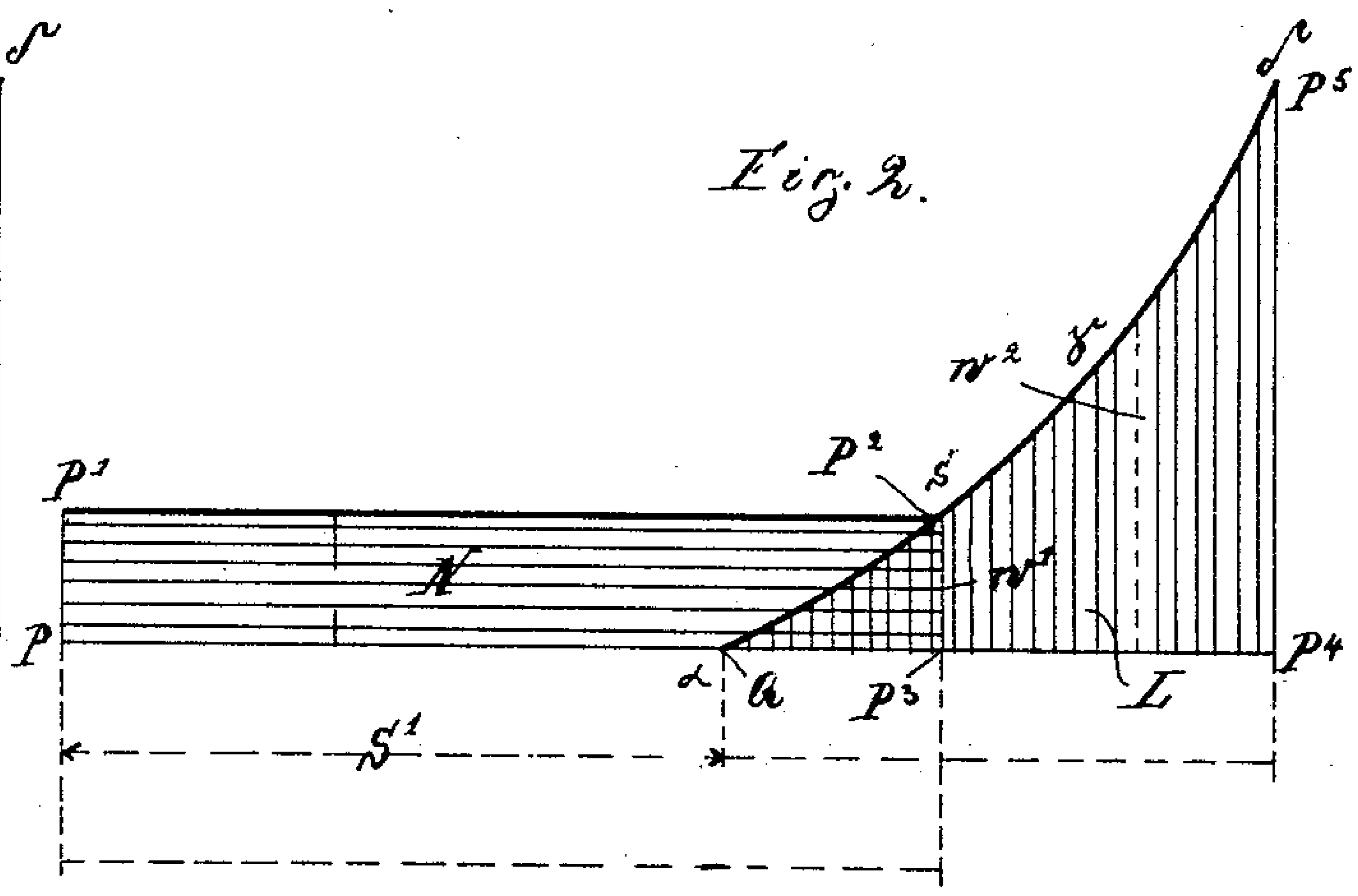


Fig. 2.



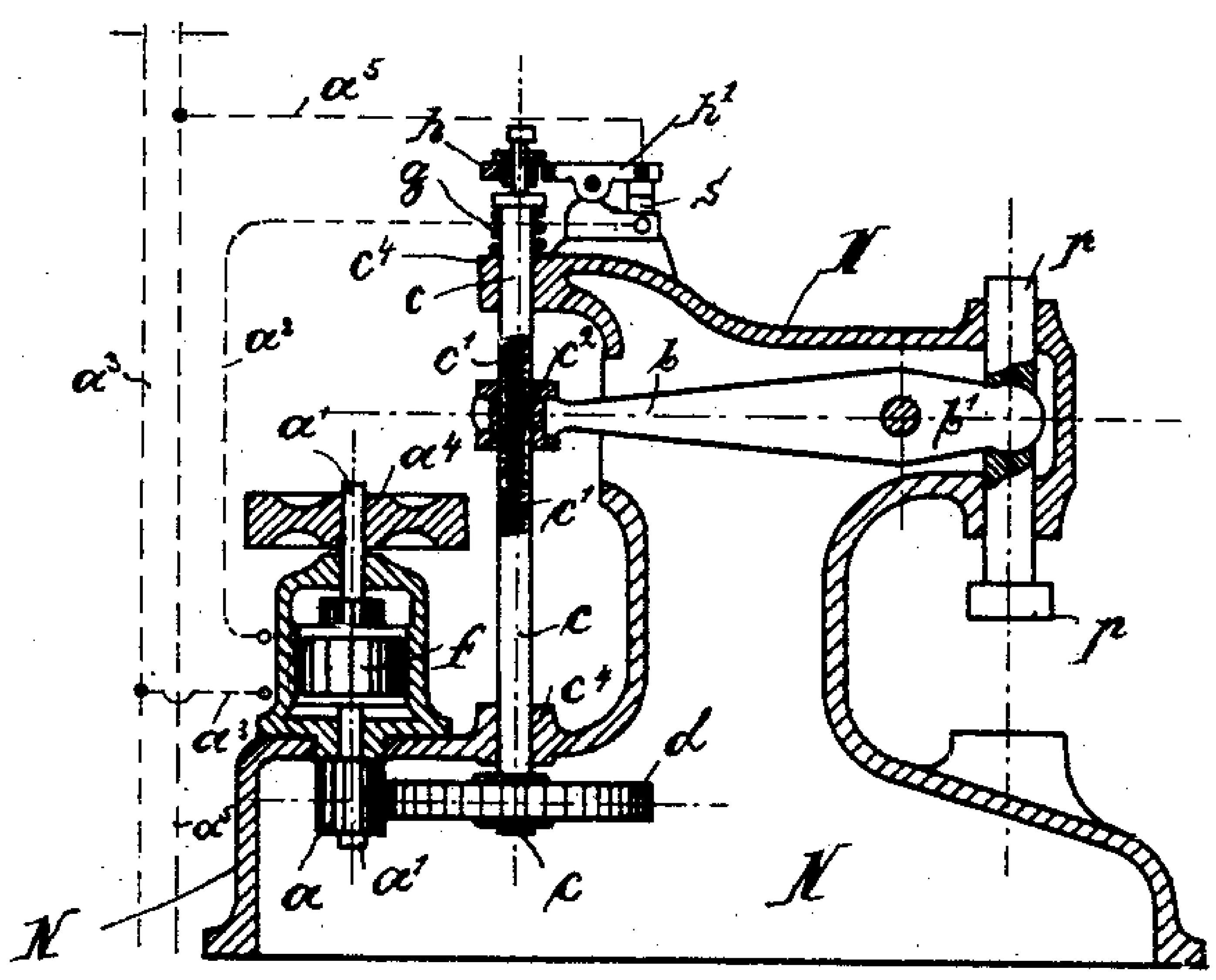


Fig. 3.

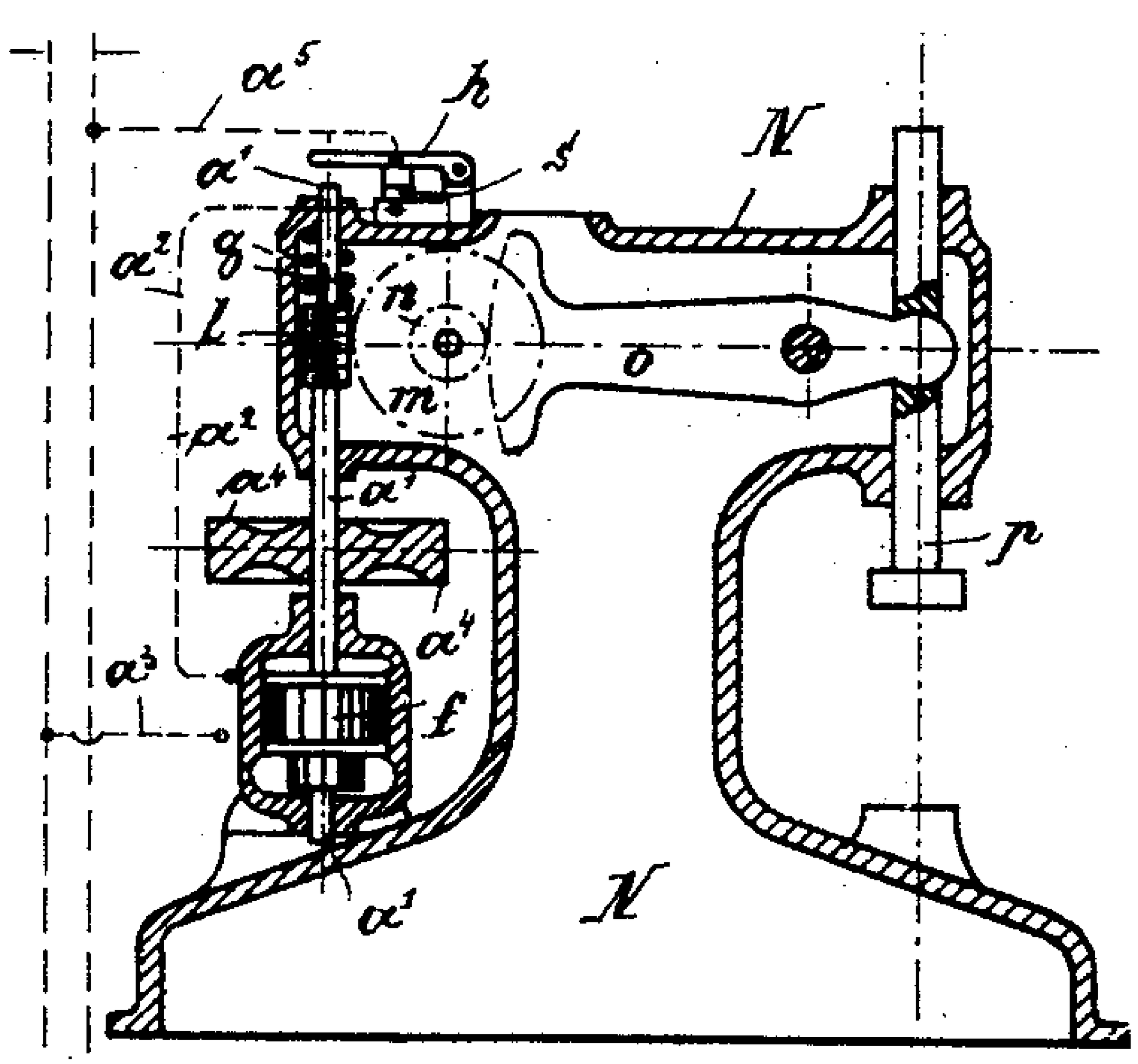


Fig. 4

Witnesses.
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Emil Kayser

Inventor
Otto Kammerer
by Robert Weigler
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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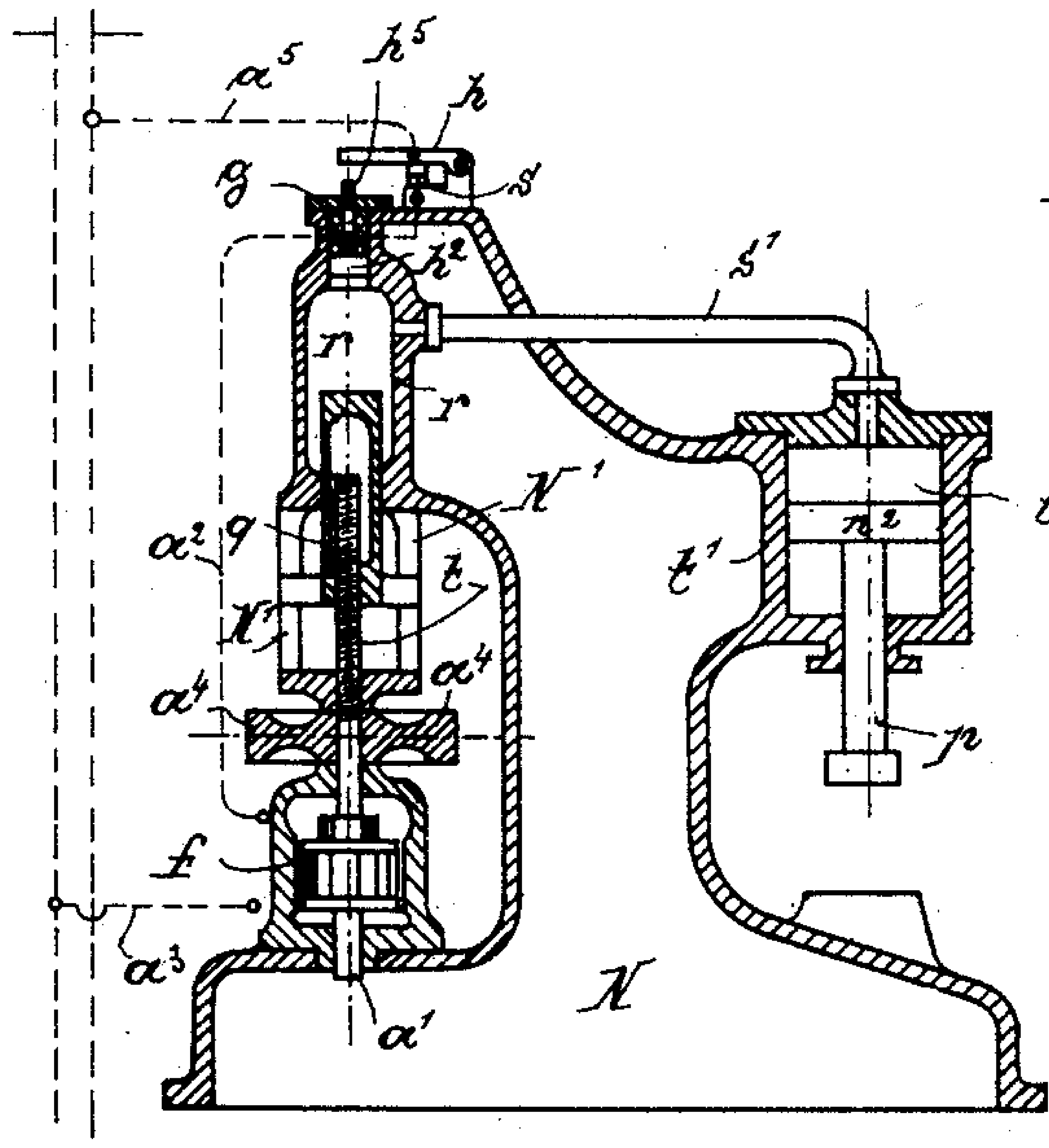

Fig. 5.

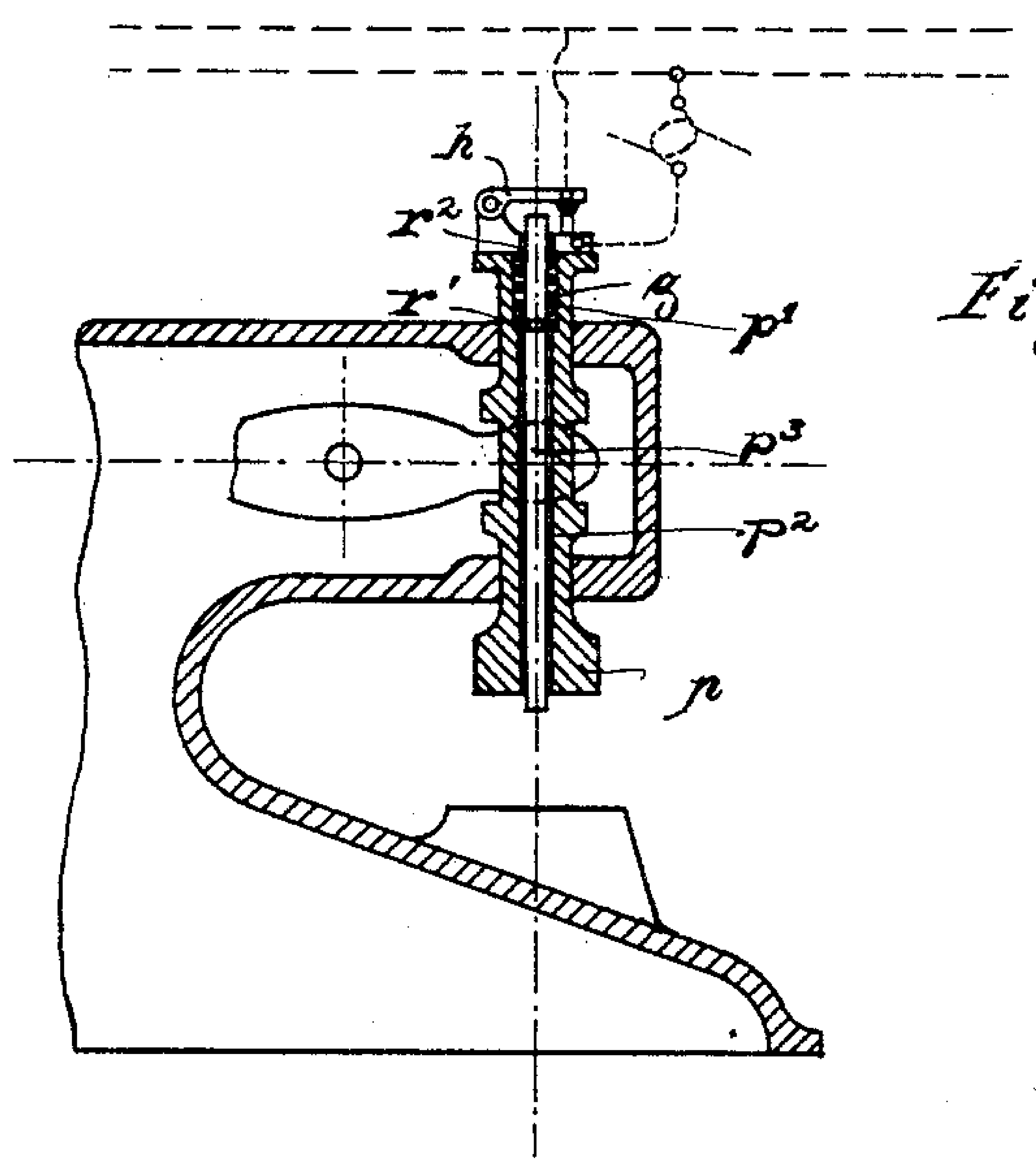

Fig. 6.

Witnesses:
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UNITED STATES PATENT OFFICE.

OTTO KAMMERER, OF CHARLOTTENBURG, GERMANY.

ELECTRICAL PRESS.

SPECIFICATION forming part of Letters Patent No. 696,053, dated March 25, 1902.

Application filed May 19, 1900. Serial No. 17,298. (No model.)

To all whom it may concern:

Be it known that I, OTTO KAMMERER, a subject of the King of Prussia, German Emperor, and a resident of 148 Berliner street, Charlottenburg, near Berlin, in the Kingdom of Prussia, German Empire, have invented a new and useful Improvement in Electrical Presses, of which the following is an exact specification.

My invention relates to presses which are set in motion by electrical power.

The purpose of this improvement is to secure the electromotor against any damage. I obtain this effect by using a fly-wheel arranged on the axle of the electromotor and by using a disconnecting mechanism for the electromotor.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts, and in which—

Figure 1 shows a diagram of the resistances during the press operation. Fig. 2 shows a diagram of the active power of the electromotor in proportion to the resistances which are to be overpowered during the press operation. Fig. 3 shows a vertical section of a press provided with the improvement. Fig. 4 shows a vertical section of a press with a modified form of the improvement. Fig. 5 shows a vertical section of the press in a second modified form of the improvement. Fig. 6 shows a vertical section of the press with the third modified form of the improvement.

N is in Fig. 3 the frame of the electric press. It bears a vertical axle a', on which the electromotor f is arranged. The axle a' is rotating by the action of the electric current in the known manner. a^2 a^3 a^5 are the wires to lead the electric current to the electromotor. On the axle a' is fastened the fly-wheel a^4 and the toothed wheel a, which gears with the toothed wheel d of the axle c. This axle has a screw-thread c', which gears with the screw-nut c^2, attached to the end b of the lever $b\,b'$. The lever b' grips into the stamp p of the press.

The vertical axle c is supported by the spring g and is pressed upward, being not firmly arranged in its bearing c^4. It is pressed by the action of the spring g against the two-armed lever $h\,h'$, so that the end h' is pressed down on the metallic seat s.

The wires a^5 a^2 of the electric current are respectively fastened to the lever h' and to the seat s, so that the electric current is closed when the lever h' is pressed down on its seat s.

The working of the electric press is as follows: The electric current sets in motion the electromotor and the rotating axle a' with the fly-wheel a^4. By the gearing the vertical axle c is likewise set in motion, and the nut c^2 of the lever b is screwed upward. The lever b' and the punch p are moved downward until the pressing action begins. As soon as the resistance of the object to be pressed is so strong that it preponderates the tension of the spring g the axle c is moved downward and the lever $h\,h'$ is free from the action of the axle c. The weight of the arm h being greater than that one of the arm h' causes the turning of the lever h', so that the electric circuit between lever h' and seat s is interrupted. The electromotor f receives no more electric current, and the pressing action of the punch p would cease if the mass of the rotating fly-wheel would not be strong enough to finish the pressing of the object.

It is clear that the safety of the good work depends upon the choice of the spring force g. Its strength determines the time in which the press is driven by the electric power. Now it will be time to give an explanation for the illustrations Fig. 1 and Fig. 2, shown in form of a scheme.

Fig. 1 shows in $\alpha\ \beta\ \gamma\ \delta$ line the increasing resistance w, which takes place during the pressing action of the press. In the beginning of the pressing action the resistance of the object to be pressed is smaller—as, for instance, at the point β it possesses only the half of the force of the resistance at the point γ, and at the end of the pressing action at δ the resistance is the largest. If w' w^2 are two measures for the force of the resistance, it is clear that I can choose the spring force g, so that in the point β of the pressing action if the resistance has reached the point w' the interruption of the electric circuit takes

place and the resistance for finishing the pressing of the object must be overpowered by the force inertia of the fly-wheel.

Fig. 2 shows that more distinctly. The field or plane N (P P′ P^2 P^3) shows the size of the work taken up by the fly-wheel. S′ designates the time in which the motor runs free without any pressing action. The pressing action begins at Q, and the electric current acts still further on the electromotor up to the point P^3. In that moment the electric current is interrupted and the forces inertiæ of the fly-wheel work alone. They have to overpower a labor L of the size of the plane P^2 P^3 P^4 P^5. It is evident that the area of the plane L must be equal to the area of the plane N if one wants to be sure that the pressing is indeed finished by the forces inertiæ of the fly-wheel.

Fig. 4 shows a modification of the arrangement. The whole arrangement is the same as in Fig. 3, only the gearing mechanisms are different. There is only one vertical axle a', and this axle bears directly the worm l, which gears with a wheel m, the tooth-wheel n, and the sector-lever o, which is in connection with the punch p. Further, the axle a' bears itself the spring g, which presses down the axle a'. The lever h, which rests on the seat s, has only one arm, and the axle a' interrupts directly the electric circuit between h and s when accordingly lifted. The action of this modification is clear without further explanation. In the essential it is the same as in Fig. 3.

Fig. 5 shows a third modification. a' is the axle of the electromotor f, which bears the fly-wheel a^4 and has on its upper end the screw-thread t. The latter is inclosed by the hollow plug q, which dips tightly in the cylinder r, filled with water or another fluid. The cylinder r bears in its upper part the small piston h^2, which is pressed down by a spring g and which has a pin h^5, adapted to push against the lever h and to interrupt the electric circuit, as already mentioned before. The cylinder r is by the tube s' in connection with the cylinder t', in which the piston n^2 slides up and downward. The piston n^2 bears the pressing mechanism p. The action is as follows: By the electric circuit the axle a', with fly-wheel a^4, is rotating, and the plug q, which is guided in the frame N′, so that it can only slide up and downward without turning itself, presses the fluid of the cylinder r into the cylinder t', whereby the pressing mechanism p is moved downward until it touches the object to be pressed. The pressing action begins, and if the resistance of the object to be pressed is so strong that the pressure in the cylinder t' and in the cylinder r is increased so much to lift the piston h^2 and to compress the spring g the electric circuit is interrupted and the action of the fly-wheel finishes the pressing operation. It is evident that by this arrangement the electric current causes at the beginning directly the pressing operation and that if the resistance is too strong it causes indirectly the finishing of the pressing operation by having given to the fly-wheel the necessary forces inertiæ. It is not necessary by this arrangement to increase the action of the electric current to the end of the pressing operation and to a height equal to the greatest resistance of the object to be pressed, but only to employ an electric current of middling power. By this arrangement the danger is avoided that a burning of the armature of the electromotor takes place which could not be avoided by the usual arrangements, whereas in the moment of the greatest strain of the motor the resistance ceases suddenly.

Fig. 6 shows a modification in which the interrupting mechanism is arranged directly above the pressing mechanism p. The pressed stamp is, as seen from this figure, provided with a bore p' on its upper part and a bore p^2 of a smaller diameter, through which projects a pin p^3. The latter rests with a collar r' against a shoulder formed on the bottom of the upper bore and is guided in a muff or a stuffing-box r^2, arranged in the interrupting mechanism. A spring g always tends to press the pin downward. The stamp is moved up and down in the heretofore-mentioned manner regarding the Figs. 3 and 4, whereby the current to the motor flows in the following manner: from the positive line of a suitable electric source to one arm of the interrupting mechanism, from the other arm of the latter to one pole of the motor, through its armature, and from the other pole of the motor to the negative line. As soon as the stamp or head of the pressing mechanism is lowered so far down that the pin p^3 touches the material to be pressed the pin rises against the tension of the spring and opens the interrupting mechanism, thus interrupting the current. Owing to the force of inertia the fly-wheel continues to rotate and causes the stamp still to descend and to press upon the material.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

In electrical presses, the combination of an electromotor, a fly-wheel rotated by this electromotor and a pressing mechanism, with a circuit-interrupting mechanism situated in the circuit of the electromotor, and means for automatically actuating the circuit-interrupting mechanism, when a certain pressure has been reached, substantially as described and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

OTTO KAMMERER.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.