(No Model.) 2 Sheets—Sheet 1

P. RIBARD.

OIL PRESS.

No. 458,002. Patented Aug. 18, 1891.

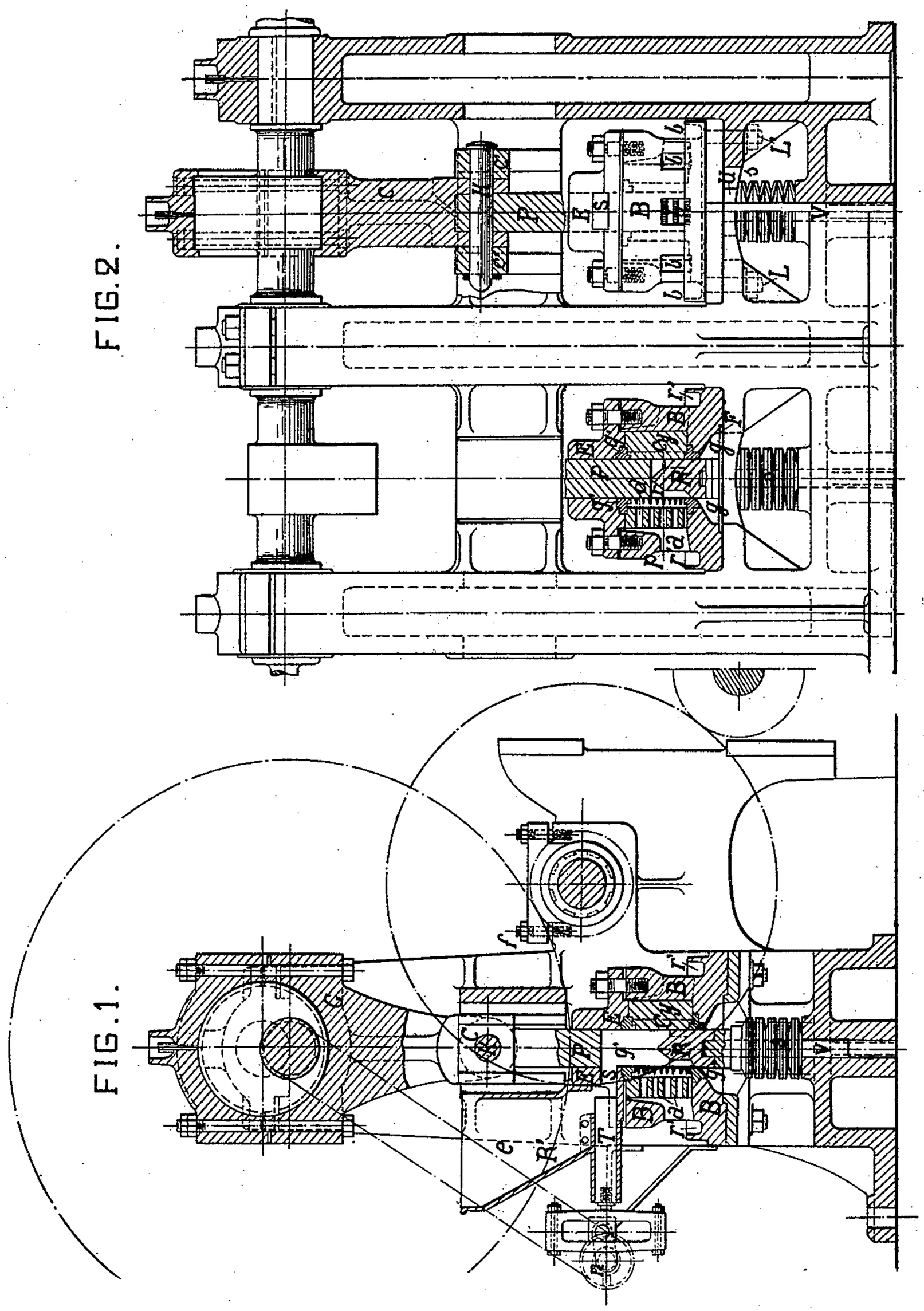

FIG. 1.

FIG. 2.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 7.

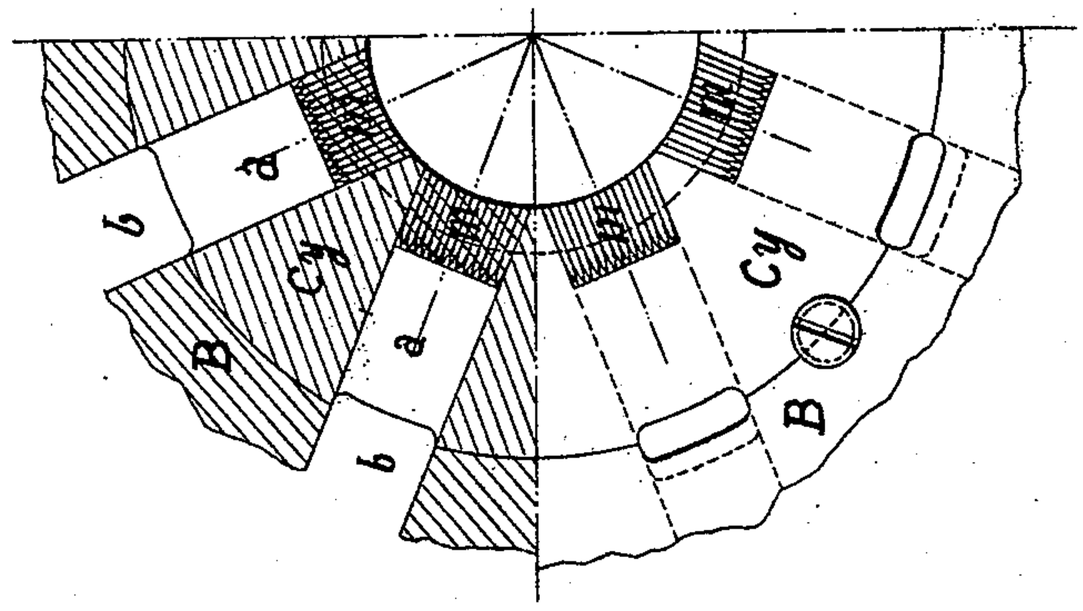


FIG. 5.

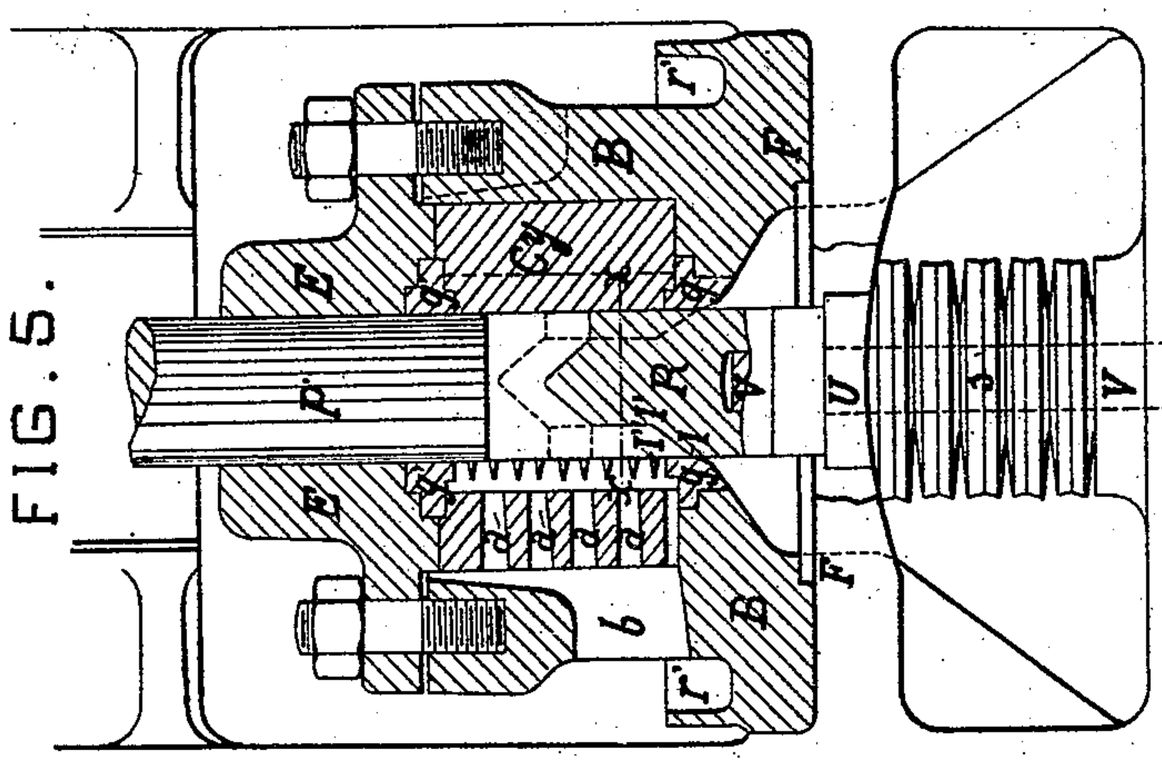


FIG. 6.

FIG. 3. FIG. 4.

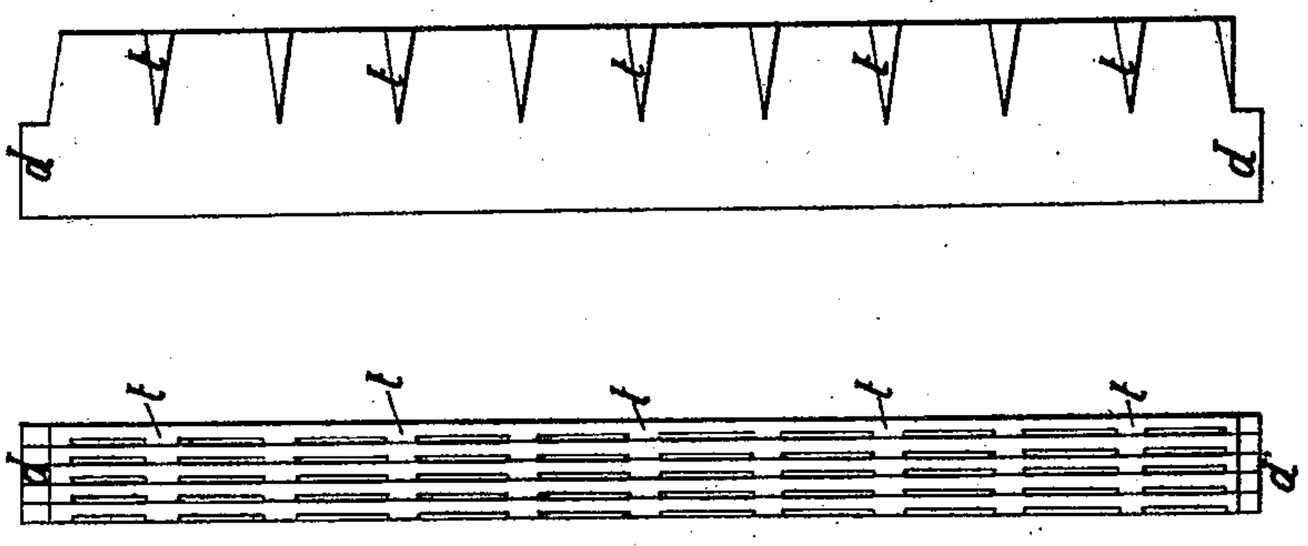


FIG. 8.

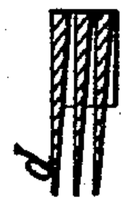
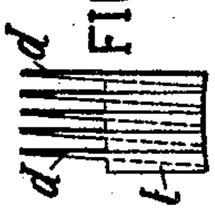


FIG. 9.



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UNITED STATES PATENT OFFICE.

PAUL RIBARD, OF TOULON, FRANCE.

OIL-PRESS.

SPECIFICATION forming part of Letters Patent No. 458,002, dated August 18, 1891.

Application filed November 20, 1890. Serial No. 372,108. (No model.)

To all whom it may concern:

Be it known that I, PAUL RIBARD, a citizen of France, residing at Toulon, in the Department of the Var, have invented a new and useful Improvement in Oil-Presses, of which the following is a specification.

My invention has reference to certain structural arrangements in presses designed to separate automatically solid from liquid parts which are found united in certain bodies, and in particular to extract oil from oleaginous substances.

In the machine constructed in accordance with my invention the substance to be pressed is introduced automatically into a chamber or closed space provided with a metallic filtering-surface, described hereinafter, and forming an important part of my invention. The substance reduced to a thin layer by the powerful compression of a reciprocating piston loses a great portion of the liquid which it contains and pushes before it a piece placed against a reacting-spring. This piece, which I shall call a "regulating-valve," and which will be described in detail hereinafter, has for its object to reduce the substance to a thin layer, which, pressed against the filtering-surface, allows the oil to run out freely and the substance to be discharged from the press after it has been subjected to a given minimum pressure and has remained subjected to that pressure for a given time, which may be regulated and varied at will by means of the springs.

This device constitutes an important improvement in the production of oil, as will be explained hereinafter. Heretofore valves similar to my regulating-valves have been constructed, but they are in fact only simple valves, which allowed the substance to go out from the press before the spring begins to act, so that the oil or other liquid has not sufficient time to run out and remains in part in the cake. On the other hand, such valves allow a compact mass to remain in the press and of such thickness that the substance touches only at its periphery the filtering-surface, through which the oil is obliged to pass before arriving at the outlets. This inconvenience is avoided in the sort of valve described below.

For the better understanding of my invention I have shown by way of example in the accompanying drawings a form of press in accordance with my system, showing only the details of construction concerning the essential points of my invention.

Figure 1 is a transverse section showing the general arrangement of my oil-press, the gears being shown only by their circumference in dotted lines. Fig. 2 is an elevation of a press having two filtering-cylinders which are identical in construction. In this figure the feeding appliances are removed for the sake of greater clearness. On the left is a section of a filtering-cylinder and on the right an exterior view of another cylinder like the first. Fig. 3 shows a number of filtering-blades placed together, and seen also in Fig. 9, which is a top view. Fig. 4 shows one of the faces of said blades, also seen in Fig. 8, in horizontal section on line $x\,x$ of Fig. 4. Fig. 5 is a section, on a larger scale, of a filtering-cylinder, designed to illustrate more clearly the form of regulating-valve employed. Fig. 6 is a horizontal section of same valve on line $x\ x$ of Fig. 5. Fig. 7 shows the central portion of the filtering-cylinder, half of which is shown in horizontal section on line $p\ r$, Fig. 2, (the upper part of figure,) half in plan, the cap being removed, (lower part of figure.) Figs. 7 and 8 are cross-sections of Figs. 3 and 4, respectively.

The piston P is attached by a pin K to the connection-rod C, and is moved in a reciprocating movement along the axis of the body of the press B B. The piston is guided in its movement with the connection-rod by two guides $c\ c'$. The slides of these guides are arranged in the cross-beam of the casting of the machine. The piston is further guided at its lower end by the cylindrical casting E E, called a "cap." This casting E E is provided with an opening S, designed to admit the substance which enters the machine. The body of the press B B is a cylindrical casting pierced with openings b, all opening into a circular trough r'. The outside cylinder serves to support the steel cylinder Cy, provided with apertures corresponding to the holes b in the body of the press and provided on the interior with eight vertical mor-

tises, in each of which are incased the vertical filtering-blades in juxtaposition. This arrangement is clearly shown in Fig. 7. Two steel washers *g g'* serve to fix the position of the blades and are designed to sustain the wear of the machine.

The filtering-blades shown in Figs. 3 and 4 are rectangular plates of steel of suitable thickness, according to the place they are to occupy, as shown in Fig. 7. These plates are planed upon one of their faces, like a knife-blade, upon which is left a series of little triangular projections, Fig. 4, forming bearing-faces, so that when the blades lie together in a group, as shown in Fig. 3, each will lie against the unplaned side of the other adjacent one. The spaces or openings between the blades may be as narrow as desired (one-tenth of a millimeter, for example) upon the interior surface of the cylinder, and they may be enlarged toward the exterior. These constitute outlets for the oil. The tenons *d d*, with which the two ends of the blades are provided, rest upon the annular shoulders of the washers *g g'*, and retain the said blades in their positions.

It is not necessary that the blades should be of the same thickness throughout, so as to fit mortises of uniform width, as shown in the drawings, since obviously the blades may converge more or less toward the axis of the cylinder.

The base of the body of the press rests upon a table cast with the frame; and the press is secured upon this table by means of four bolts L L', Fig. 2. This table is hollowed in the center, and is provided with a shoulder F, designed to center accurately the body of the press.

The regulating-valve R is a metallic piece provided at its upper portion with a conical point and upon the sides with three grooves or recesses separated by three wings Z Z' Z'', Fig. 6. This valve is placed upon a stem V, which is provided with a metallic ring U, against which bears a series of circular Belleville springs *s*, the whole resting upon the bottom of the frame. A hole pierced in the frame serves as a guide for the lower part of the stem V. The bottoms of the three grooves or recesses of the regulating-valve are inclined and follow the inclination of the cone, of which the line I I', Fig. 5, is the generatrix. This inclination may be varied according to the nature of the oleaginous substance to be treated, and the thickness or depth of the grooves (represented at E, Fig. 6) may be varied in like manner to regulate the thickness of the layer of cake which may be allowed to accumulate between the valve and filtering-surface. The function of the wings Z is to divide the matter and cause it to press in thin layers against the filtering-blades. They also serve as guides, keeping the valve in line with the axis of the cylinder.

The Belleville springs, which support the regulating-valve, are such that half the extent of their total compression, flattened as each pair should be at a given pressure, is equal to the length I I', Fig. 5. It is, in fact, this distance which the valve (shown in its initial position in dotted lines in Fig. 5) ought to move against the resistance of the springs before the oil-cake contained in the recesses can find an outlet from the press.

The operation is as follows: Let us suppose the press to be clean and empty. The grains are introduced into a hopper R', Fig. 1. They may be whole or crushed or rolled; but they should at all events be hulled and cleared of all foreign matters. The slide T receives from the crank *n* a reciprocatory movement derived from the principal shaft by a belt *e* (or gearing may be used.) This belt is geared in such manner that just as the piston uncovers the opening S the slide T pushes forward a charge of the grains, which fall into the press. After the action of the piston P the slide is withdrawn and disappears under the bottom of the hopper R. Thus when the opening S is closed the grains are compressed in a close chamber and the oil is forced out. Almost immediately a mixture of air and liquid will begin to ooze through the filter and runs toward the trough *r*. The piston continues to descend; but as it has already traversed more than half of its course its speed diminishes, which is an advantageous point, because, the cake being formed, the interstices in which the oil should circulate in passing through the cake on its way to the outlets become capillary. More time must, therefore, be allowed for its escape. If the power were too great in the propulsion of the substance, the liquid would remain in part in the cake. This novel arrangement of regulating-valve is very important, inasmuch as it gives to the oil ample time to escape—that is, the time which the valve takes to cover the distance I I'', Fig. 5—instead of permitting the cake to escape as soon as the pressure has attained a sufficient power to compress the spring, be it ever so slight.

Let us continue to analyze the function of the machine. The piston P finishes its course; but as we are considering the first stroke of the piston the regulating-valve has not been able to move the distance I I', Fig. 5, as the pressure has not yet been sufficient, and the cake, in part exhausted, finds sufficient space to lodge in the recesses of the valve. As the piston recedes, the slide T advances toward the entrance S' and feeds a second charge beneath the piston. On the next stroke of the piston more oil is expressed and more cake is formed, for which there is now insufficient room. Consequently as the pressure increases the regulating-valve R yields the distance I I'', against the pressure of springs *s*, and under the increasing pressure the exhausted matter which fills the channels of the valve begins to escape from the cylinder and the friction of the compressed

mass maintains the regulating-valve in position until the piston shall have completed its descent.

It will be understood that the discharge of the thoroughly-exhausted matter can only be effected at a great pressure, and only after this pressure has been maintained for a certain time—namely, while the valve is moving over the distance I I″. When the piston P begins to reascend, the valve in pressing the substance remaining in the press against the bottom of piston P ascends also. This movement continues and the pressure increases proportionately until the reaction of the springs is equalized by the friction of the drained matter, which remains in the recesses of the valve. When the grains of which the cake is composed have been compressed, the valve ascends to its initial position. If the cake is close-fitting, wrinkled, or adheres to the metal, the reaction of the springs will not be complete, and the point I will remain after each stroke somewhere between I and I″, Fig. 5. Whatever happens and whatever grain is treated, after two or three first strokes of the piston the valve will return obviously to the same position.

The machine is regular in its operation notwithstanding slight variations that may occur in the volume or weight of each charge, which may cause the valve to open or close a little sooner or later and not exactly at the point when the springs have been compressed to half the full extent. After several strokes of the piston the cake produced will be a uniform composition.

In the preceding description I have described the springs as Belleville springs; but it is obvious that any other equivalent elastic devices may be used without departing from the spirit of my invention. I reserve also the right to substitute the dash-pot of a hydraulic press for the springs, so placed that the axis of the piston of these presses occupies exactly the place of the axis of the stems V, guiding the springs. These dash-pots of the hydraulic press receive water under pressure derived from a hydraulic accumulation, for example.

I claim—

1. In a filter-press for the extraction of oil from oleaginous substances and for like purposes, the combination, with a cylinder having a series of mortises, of filtering-surfaces composed of plates or blades of steel laid face to face and provided with projections or bearings and intervening spaces for the escape of liquid, said plates being supported in said mortises, substantially as described.

2. The combination, with the cylinder and piston or compressing device of a filter-press, of a regulating-valve and its springs, said valve having a cylindrical body which fits in a cylindrical valve-opening of the press, so that the valve cannot open to permit escape of the material treated until such material has been subjected to a certain minimum compression, substantially as described.

3. The combination, with the cylinder having filtering-surfaces and a piston or compressing device, of a regulating-valve set and held in the valve-opening by the resistance of powerful springs and arranged to open the discharge-outlet only after it has traveled a certain distance, as specified, said valve being provided with a conical point and with guiding-wings and intervening grooves or recesses in which the cake is compressed against said filtering-surfaces, substantially as described.

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

PAUL RIBARD.

Witnesses:

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