

No. 688,976.

W. N. SHERWOOD.
PULP ENGINE.

Patented Dec. 17, 1901.

(Application filed June 1, 1899.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

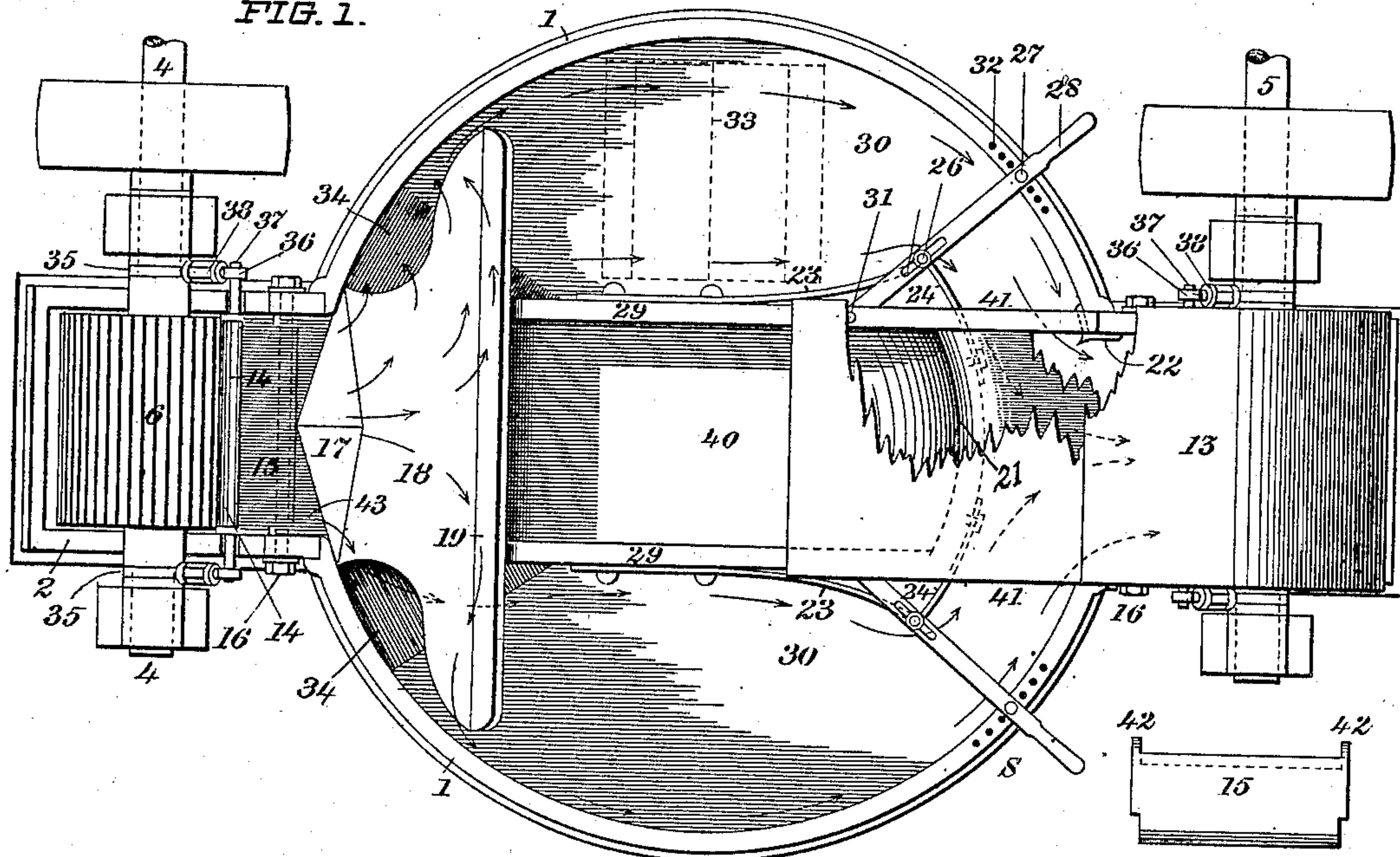


FIG. 2.

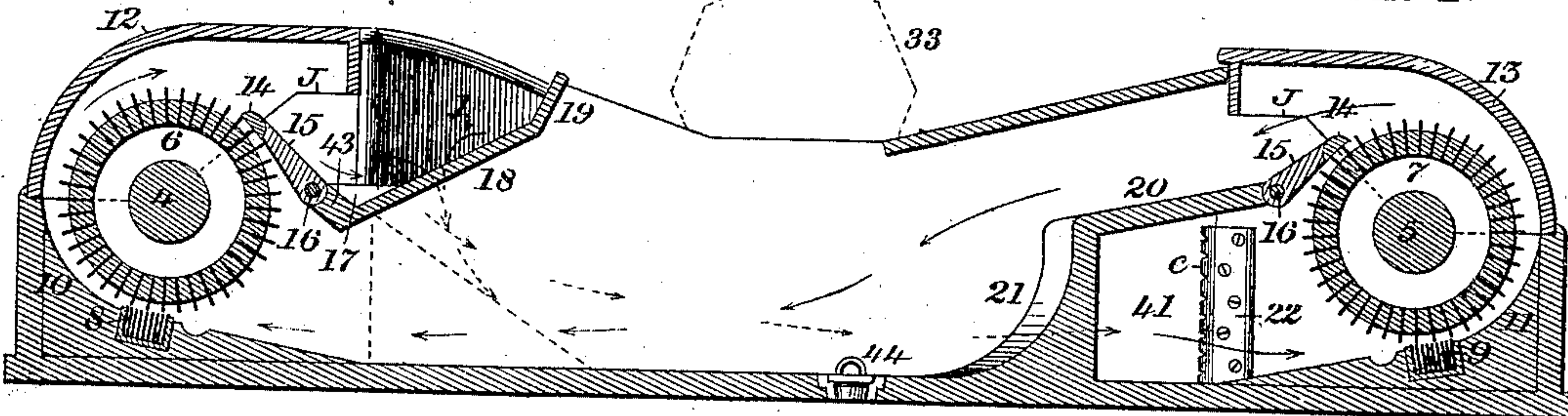
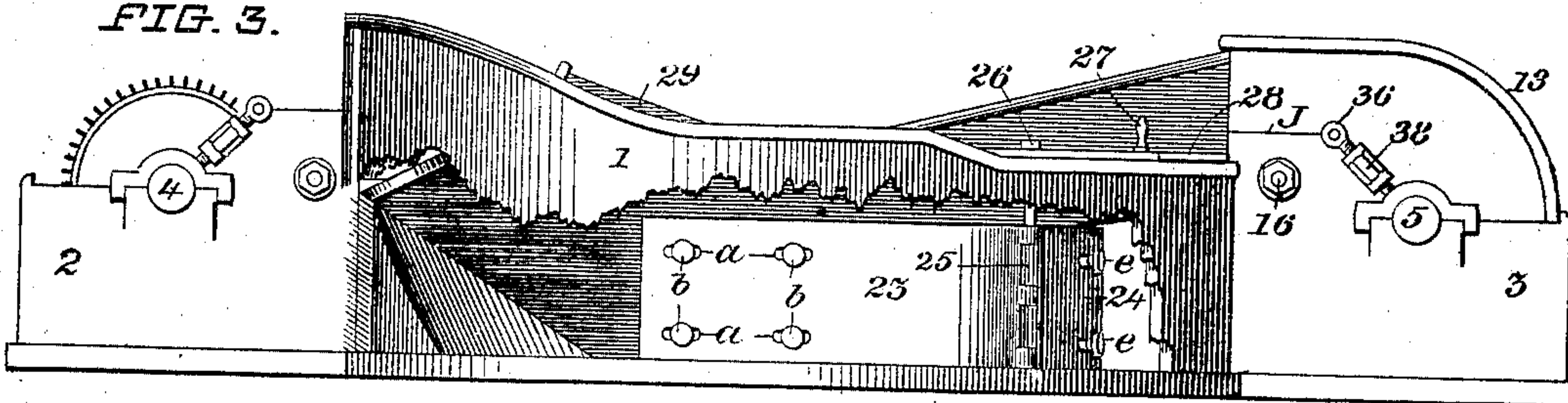


FIG. 4.

FIG. 3.



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No. 688,976.

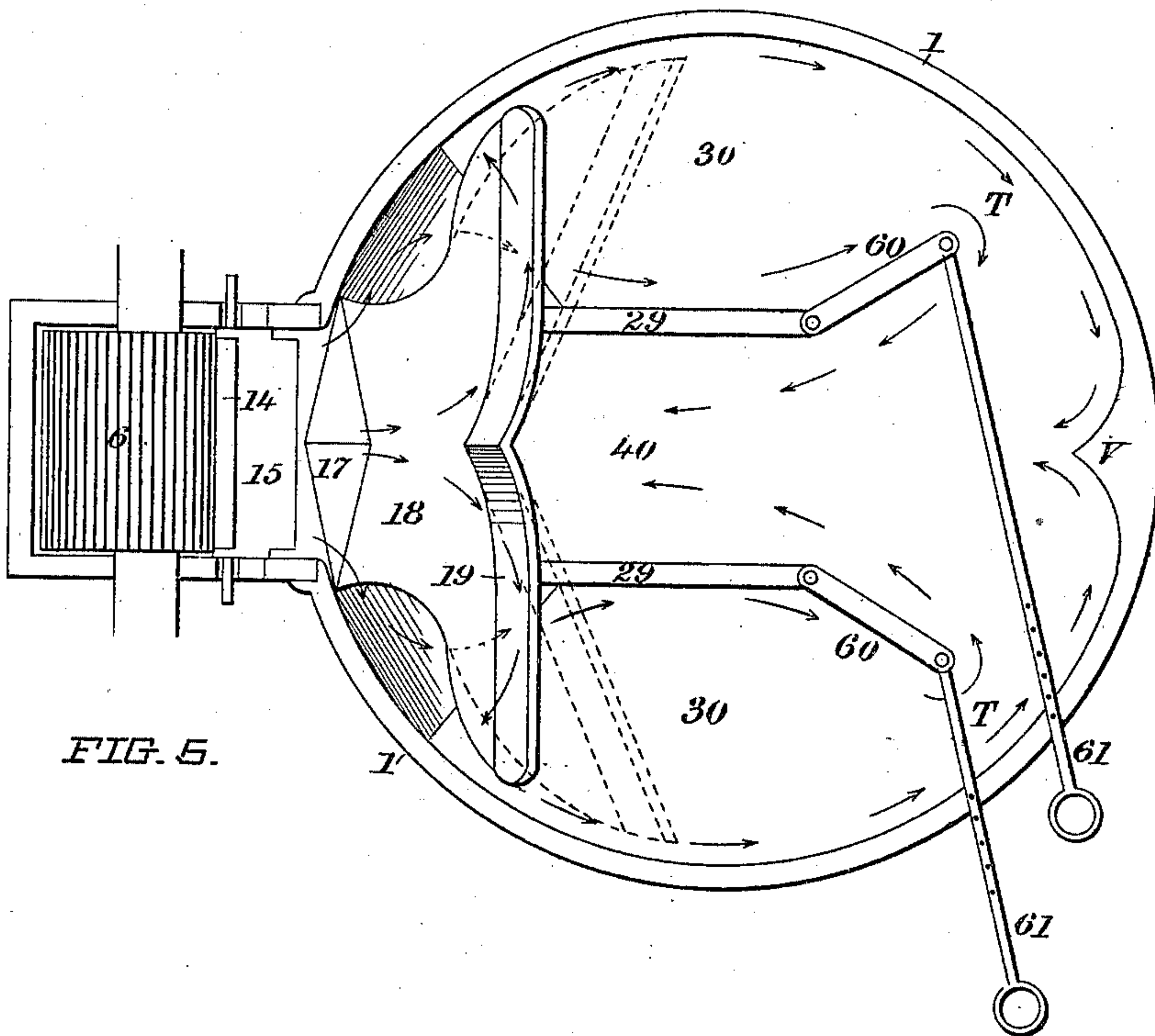
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UNITED STATES PATENT OFFICE.

WALTER N. SHERWOOD, OF HOOSICK FALLS, NEW YORK.

PULP-ENGINE.

SPECIFICATION forming part of Letters Patent No. 688,976, dated December 17, 1901.

Application filed June 1, 1899. Serial No. 718,940. (No model.)

To all whom it may concern:

Be it known that I, WALTER N. SHERWOOD, of the village of Hoosick Falls, in the county of Rensselaer and State of New York, have
5 invented certain new and useful Improvements in Pulp-Engines, of which the subjoined description, taken in connection with the accompanying sheet of drawings, constitutes a specification.
10 This invention relates to improvements in that class of engines employed in the manufacture of paper for beating and refining pulp material and especially "half-stuff." The "Hollander" engine was one of the earliest
15 types of the class to which this improvement relates, and it is to overcome some of the defects in that class that this invention has been devised. One of the most serious of these defects was and is that where a single beating-
20 roller is used and the stock moves around a mid-feather the material nearest the mid-feather is beaten or refined more than that which travels on the outer rim of the orbit. This more rapid circulation of the stuff in the
25 central part of the engine and sluggish circulation near the outside produces a very uneven product unless the stuff is constantly stirred up, so as to secure a homogeneous mixture. To devise an engine which shall
30 both beat and mix the stuff homogeneously and automatically has for a long time been a desideratum, and this invention has these objects in view.

The invention resides in, first, the use of
35 two beating-rolls located on opposite sides of a tub and substantially outside thereof; second, special provisions for taking the stock from the top of one roll and turning it over and mixing it in its passage to the other roll;
40 third, in the use of a three-way tub consisting of two side passages and a midway passage, the rolls being placed at the extremities of the central passage; fourth, in the general arrangement and relation of parts whereby
45 the disparity in the circulation of the stock through the side passage-ways is counteracted and neutralized in its return through the midway, and, fifth, the several details provided for directing and controlling the circulation of the pulp.
50

As some features of my invention may be used in engines in which but one beating-roll

is employed, I have shown a modified form of such an engine with such features applied.

The invention is fully disclosed in the drawings, wherein—

Figure 1 shows a plan of my improved engine with the cover removed from one of the beating-rolls. Fig. 2 is a vertical longitudinal section taken through the center of the
60 midway of the tub. Fig. 3 is a side elevation of the engine with one roll-cover removed and the side of the tub next the observer broken away to expose the interior. Fig. 4 is a detail of one of the parts of the backfall. Fig. 65
5 is a plan of a single-roll engine with parts of my invention applied.

A leading feature of my invention consists in dividing the stream of pulp as it comes from the roll by means of a mixing-shelf, onto
70 which the stuff is delivered from the roll, and turning half the volume of it into a side channel on each side of the machine, through which it is forced to a passage-way which communicates with a central return-channel, through
75 which it returns to the roll again. In the machine shown in Fig. 1 the line of communication is around roll 7. In the modification shown in Fig. 5 but one roll is employed, and the mid-feathers do not extend entirely across
80 the tub, so that the side currents can pass around the ends of the mid-feathers and return through the central channel back to the roll 6. In this case the stock is submitted to
85 but one treatment at each circuit; but the operation of the mixing-shelf and the deflectors is precisely the same as in the double-roll machine. The machine of Fig. 5 is provided with deflectors 60 60, which are adapted
90 to swing laterally in or out for the purpose of lengthening the circuit to be traversed by the pulp in the outside channels adjacent to the mid-feathers in case it is inclined to travel
95 faster than that next to the curb, and they perform precisely the same function as the deflectors 23 of the tub of Fig. 1. Opposite the center of the middle channel the inside of the curb is fitted to the shape shown at V for turning the two inflowing side currents as they pass through the two passages T T to-
100 ward the center of the mid-channel.

To all intents and purposes my machine is a combination of two halves, each of which constitutes a complete engine in itself, but

which operate more satisfactorily in combination, inasmuch as in the duplex form a more symmetrical action is secured and the reduction of the pulp can more readily be accomplished.

The principal tub is shown at 1, which is circular in form, but may be of an elongated form, if preferred. On opposite sides of this tub the two extensions 2 and 3 are built, which constitute roll-chambers for the beating-rolls 6 and 7. These rolls are of ordinary construction and are carried on journals 4 and 5, which run in bearings on stands of any suitable design. They cooperate with the bed-plates 8 and 9. The backs 10 and 11 serve to carry the pulp up and in connection with the covers 12 and 13 to carry and deliver it over onto the backfalls 15 15. The end walls of the roll-chambers are extended across the middle part of the tub 1 and constitute the mid-feathers 29 29. An opening 41 is made through each mid-feather to allow the pulp to pass from the side channels 30 30 to the under side of the roll 7. The midway 40 is divided by the cross-partition 21 to prevent the pulp from either side channel passing into the midway until after it has passed under the roll 7. A bridge 20 extends from the backfall of roll 7 to the partition 21, which serves as an apron to convey the pulp from the backfall to the midway 40. The backfall of roll 6 delivers the pulp onto a mixing-shelf 18, to the upper edge of which a fender 19 is attached to prevent the pulp from being forced over into the midway. The centrifugal velocity of the roll throws the pulp over onto the shelf with much force, some of it striking as far forward as the fender. By reason of the slope of this shelf the stuff inclines to slide back toward the roll, but is met by the torrent of stuff as delivered from the roll and is driven back again. These opposing forces act upon the stuff to thoroughly mix it, and this continues until the volume accumulated on the shelf forces it along laterally over the ends of the shelf into the side channels. The mixing which thus takes place on this sloping shelf is of a very thorough character, the stock taking on an eddying movement in the process, as it were. The side edges of this shelf are formed of a shape substantially as shown, so that the stuff which comes from the ends of the roll will be immediately crowded around off the shelf at the point nearest the mid-feather, and that part coming from the center of the roll will be forced along and across the middle of the shelf toward the fender, where under the impulse of the stream of stuff delivered from the roll it works along toward the ends of the shelf and finally is shoved off near the staves of the curb of the tub, and thence is crowded by the greater volume of the pulp near the mid-feathers toward the outside of the side channels, which relative position it will keep until it reaches the roll-chamber 3. This mixing-shelf may be set at any desired angle

or may be made adjustable in that respect. A change in its slope influences the movement of the pulp which it carries. The nearer level it is the more rapidly the pulp will pass over it. The external jamb of each opening or port 41 is armed with a sharp vertical knife 22, the office of which is to assist in cutting or stripping up any long pieces of stock, like long sheets of paper, strings, strands of rope, or cloth which may have been furnished to the machine in the stock. Below the ends of shelf 18 two inclines 34 34 are provided, onto which the pulp falling from the shelf nearest the mid-feather slides down to the bottom of the side channels. Each roll is provided with an adjustable scraper 14, the under surface of which is fitted to the curvature of the roll, while each end is pivoted by a journal 37 in an ear 42, Fig. 4, of the backfall 15. The backfall is hinged by means of rod 16 to the bridge-piece 43, which forms a part of the pulp-table of which the shelf 18 forms the opposite side. The ends of the journals of the scrapers are carried in adjustable bracket-bearings 36, each of which forms a member of a turnbuckle combination, of which the corresponding end is shown at 35. Each of these members is oppositely threaded, and the two are connected by the turnbuckle 38. By means of this device the scraper may be set up as closely as may be desired toward or against the roll. This provision is to accommodate the changed position of the roll as the knives of the roll and bed-plate wear away. The covers 12 and 13 form a joint with the curb or case on a line which connects the center of the scraper with the center of the roll, so that when the cover is removed the scraper may be detached. A discharge-valve 44 is provided in the bottom of the tub, whereby its contents may be drawn off.

No means for raising or lowering the rolls are shown in the drawings for the reason that any of the well-known means for accomplishing that function may be employed, and so of the washers. Their use and location are suggested by the dotted lines at 33; but they may be supplied and as many of them be employed as the character of the work may demand.

For the purpose of equalizing the flow of different parts of the current of pulp through the side channels, so that that portion next to the mid-feather shall not travel faster than that next to the curb, and as a consequence pass under the rolls more frequently, I have provided two adjustable deflectors or wings 23 24 23 24. I effect this in part by increasing or diminishing the width of the channel-outlet of the passages 30 30. These deflectors consist of flexible plates 23, one of which is attached to each mid-feather by means of elongated slots *a a* and flange-bolts *b b*, as seen in Fig. 3. To the free end of each of these is hinged a plate 24 by means of the pin 26. Plate 24 is also held in its working posi-

tion by means of the slots and flanged bolts seen at *e e*, Fig. 3. The pin 26 passes up through a hand-lever 28, which is pivoted at 31 on the mid-feather, its outer end terminating in a handle, and its position is fixed by the holes and pins 32 27. To set these deflectors, the flange-bolts are loosened, and by means of the handles the hinge is thrown out or drawn in, as the case may be, when the flange-bolts are fastened and the pins 27 inserted. These levers and pins, however, are not essential, for after the bolts are tightened they may be removed. When the deflectors are thrown to the outside of the curb, so as to narrow the throatway or passage for the pulp from the incline 34 to the port 41, the effect is to divert that part of the pulp next to the mid-feather outwardly, and thus compel it to mix with the current flowing next to the curb, so that when the stream passes through the ports 41 it will pass to the roll 7 more homogeneously mixed than it otherwise would be. At the same time its velocity would be retarded so as to flow in unison with that part next to the curb. These are matters, however, which must be determined in accordance with the character and action of the particular stock undergoing treatment. The deflectors are provided for these purposes, if found necessary in any case.

The top edge of the curb next to the roll-chamber 2 is carried up to the same height as the cover of that roll to prevent the pulp as it comes from the roll being scattered or thrown over the curb from shelf 18. On the opposite side of the machine, as seen in Fig. 3, the top of the curb is cut down to accommodate the attendant in furnishing the engine.

The backfall 15 is hinged to a rod 16, which extends through the tub, which arrangement permits it to swing up and down as the beating-roll is either raised or lowered. This feature of an adjustable backfall is a desirable feature in my improvements, as by its use in conjunction with the scraper, which is attached to it, the closest possible adjustment of the scraper to the roll is rendered feasible.

In the construction of these engines I do not confine myself to the particular shape of the mixing-shelf shown in the drawings, for it may be considerably varied without departing from its principle of operation. I refer more particularly to its slope and the extent to which its sides may be carried around on the inside of the curb. In Fig. 5 I have shown in dotted lines a contour for the mixing-shelf, by the use of which much of the pulp after it is thrown onto the shelf can be carried well to the outside of the side channels before it is dropped into the tub. By giving the shelf the inclination shown in Fig. 2 as the pulp accumulates on it and is forced forward against the fender a tendency is created for it to fall back upon itself or toward the roll. This tendency, in connection with the tendency of the current

to break in the middle and flow to the sides of the shelf when combined, produces a rolling or twisting motion which is very effective in accomplishing a thorough mix of the stock before it enters the tub and starts on its return trip to the roll again. This is the first step in the mixing process and perhaps the most effectual one. The next takes place in the process of delivery off the shelf and in sliding down the inclines 34. As the engine-tub is nearly full when properly charged the inclines are practically submerged, but gravity compels a sliding forward action of the pulp above the inclines toward the bottom of the side channels, so that the pulp which is carried over the shelf at or near its outward extremities becomes mingled with pulp which comes from the parts of the shelf nearer the roll. As the pulp leaves the inclines it spreads out on the bottom of the side channels, and as it approaches its turn around the ends of the mid-feathers in passing the deflectors further mixture ensues, due to the compression brought to bear on it in passing through the contracted passage-way in order to turn the ends of the mid-feathers, as in Fig. 5, or to pass through the ports 41, as in Fig. 2. Finally, as the two side currents meet in the center channel, as in Fig. 5, or in the roll-chamber 3, as in the double-roll machine, the two currents to a certain extent become confluent, whereby further mixture results.

The operation of the machine is as follows: The stuff is supplied to the tub at S and passes in the direction of the arrows through the port 41, around into the roll-chamber 3, and thence around roll 7. Passing through between the roll and the bed-plate it is carried by the roll and delivered over onto the backfall 15 and thence over the apron 20 into the midway or center channel 40, through which it passes to the roll 6. This roll carries it over and delivers it onto the backfall 15, on which it slides down onto the lower part of the shelf 18. A considerable quantity of the pulp is thrown well forward onto the front part of the shelf by the centrifugal force of the roll, that which is cleaned off by the scraper 14 constituting the greater part of what is carried off by the backfall. That part of the current coming from the ends of the roll as it reaches the corner-jamb formed by the curb and the walls of the roll-chamber turns abruptly around and tumbles off the shelf 18 at its lowest point next to the curb and falls onto the incline 34 at its highest point and slides down close to the mid-feathers, and following the same passes through the ports 41 41 and being forced to the center of the passage-way leading to and under roll 7 is carried under the middle part of that roll and by it over into the center of the midway 40, through which it passes to the center of roll 6. The stuff coming from the center of roll 6 is forced up onto the shelf 18, and so on to the ends of it, where it is dropped into the side channels next to the

curb. In its further movement it clings to the curb and in passing through the ports 41 turns a short corner around the stripping-blade 22 and passes under the end of the roll 7 and thence along next to the mid-feathers to the ends of roll 6. Thus it will be seen that with the double-roll engine all the contents of the engine at each circuit around the tub and under the rolls are practically thoroughly mixed on the mixing-shelf, then turned bottom side up in passing off the shelf into the side channels, and in passing from one roll to the other change position from the center of one roll to the ends of the other one. In this way the pulp alternately makes a short or inside circuit of the engine and then an outside or long circuit, so that the differences of treatment of the pulp, if any exist, are equalized and a homogeneous product is the result.

What I claim as my invention, and desire to secure by Letters Patent, is the following:

1. The combination in a pulp-beating engine of a tub for the circulation of the stock having a central channel and two side channels, a beating-roll and bed-plate at one end of the central channel, a mixing-shelf connected with the roll for receiving the pulp after it passes the roll on a plane above the central channel and dividing and delivering it to the side channels, and provisions at the opposite end of the central channel for returning the two side currents of pulp into the central channel.

2. The combination in a pulp-beating engine, of a tub with three channels in the same horizontal plane arranged side by side, a beating-roll and bed-plate at each end of the central channel, each adapted to receive the current of pulp below the roll and to deliver it above and in front thereof on a mixing shelf or apron above the inflowing current, one of said receiving appliances being adapted to divide the volume of pulp received and to deliver a moiety thereof to each of the side channels, and the other receiving appliance being adapted to receive and deliver the pulp from the other roll into the central channel through which it passes to the opposite roll.

3. As an improvement in pulp-beating engines, a tub circular in form having two transverse mid-feathers whereby the tub is divided into three channels, a roll-chamber, beating-roll and bed-plate located at one end of the central channel and practically outside of the circle of the tub, means connected with the roll whereby the pulp after passing the bed-plate may be divided between and delivered into the two side channels; and means connected with the end of the central channel opposite the beating-roll whereby the pulp from both side channels may be turned into and return through the central channel to the beating-roll.

4. As an improvement in pulp-beating en-

gines, a tub, circular in form, divided by two mid-feathers into three channels side by side, a roll-chamber, bed-plate and beating-roll located on opposite sides of the tub at each end of the central channel, both side channels communicating at their delivery ends with the roll at one end of the central channel, which roll after treating the pulp delivers it to the central channel through which it passes to the other roll.

5. The combination in a pulp-beating engine of a pulp mixing and distributing shelf located adjacent to a beating-roll substantially as shown, with a tub having two lateral channels and an intermediate pulp-channel, the shelf spanning the central channel, and having lateral extensions over the side channels by means of which the pulp taken from the roll is divided and each moiety thereof is spread over such extension and thence distributed to the side channels, substantially as specified.

6. The combination in a pulp-beating engine of a tub divided into a plurality of laterally-intercommunicating circulating-channels with a laterally-movable deflector located in one of said channels and adapted by its movements to widen or narrow the same.

7. In a pulp-beating engine, the combination with the mixing-shelf and side channels, of the inclines located beneath the mixing-shelf, substantially as specified.

8. The combination with the beating-rolls and the mixing-shelf, of the scrapers and means connected therewith for adjusting them to the varying diameters of the rolls, substantially as specified.

9. The combination with the beating-roll and the mixing-shelf, of the pivoted backfall, the scraper attached thereto, and devices for adjusting the same to the varying diameter of the roll, substantially as specified.

10. The knife 22 in combination with the tub and beating-roll located immediately beyond it in the direction of the flow of the current of pulp, substantially as specified.

11. A backfall for beating-engines hinged to some stationary part of the engine, in combination with the roll, and means connected with the backfall for adjusting its forward edge to the surface of the roll, substantially as specified.

12. In a beating-engine, a backfall hinged substantially as shown, provided at its free edge with a scraper which rests in close proximity to the surface of the roll, and means for adjusting the scraper to the surface of the roll, substantially as specified.

In witness whereof I have hereto subscribed my name in the presence of two witnesses.

WALTER N. SHERWOOD.

Attest:

EMILY SCOTT,
FRANKLIN SCOTT.