No. 700,277. Patented May 20, 1902.

L. WILSON.

GAS IMPACT ENGINE.

(Application filed Aug. 14, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

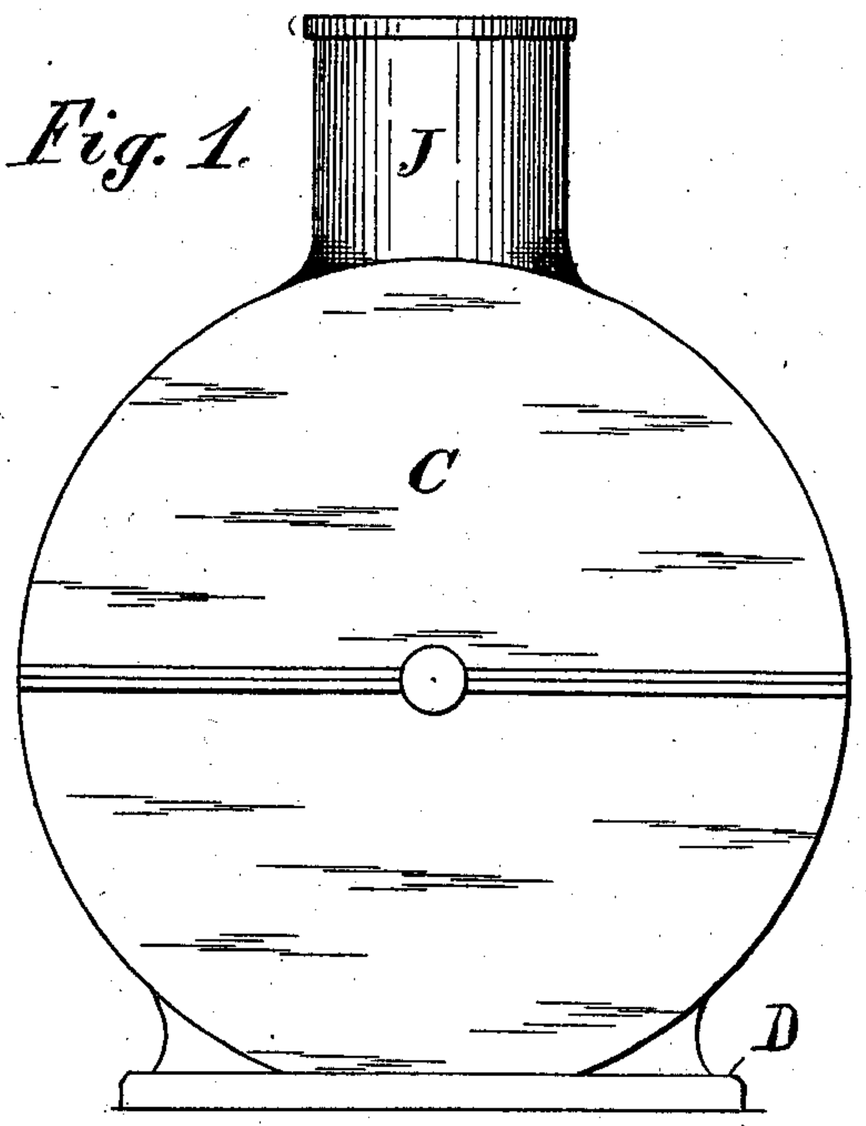
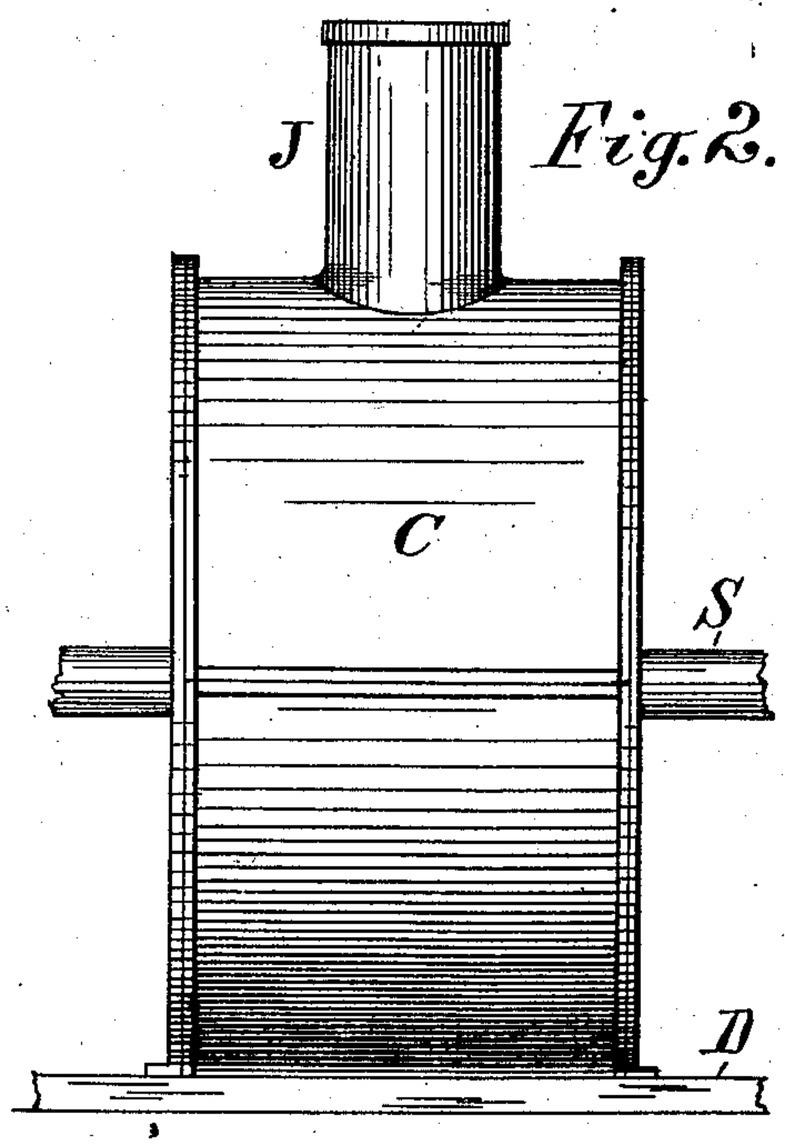


Fig. 2.



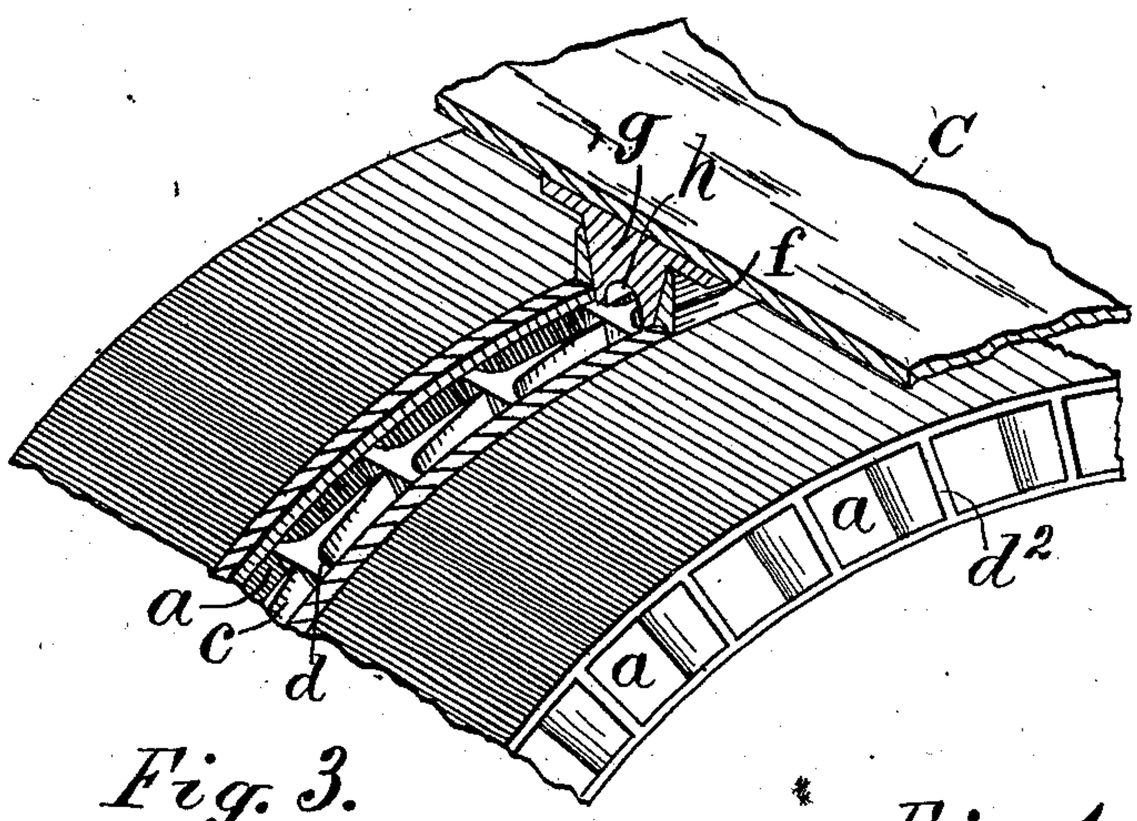
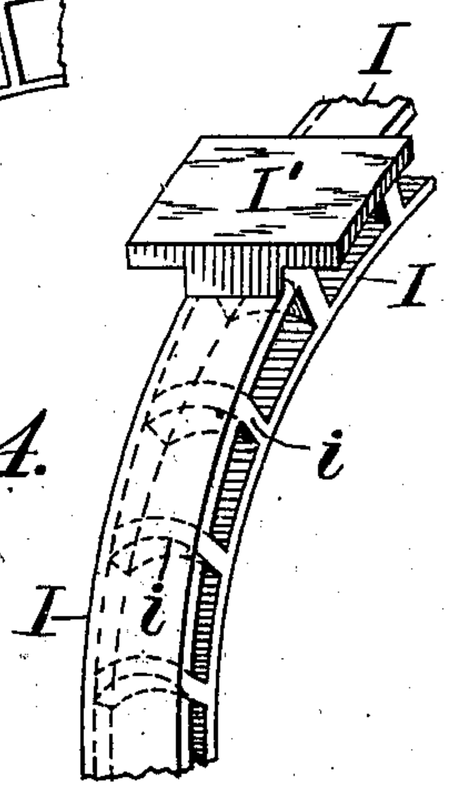


Fig. 3.

Fig. 4.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 5.

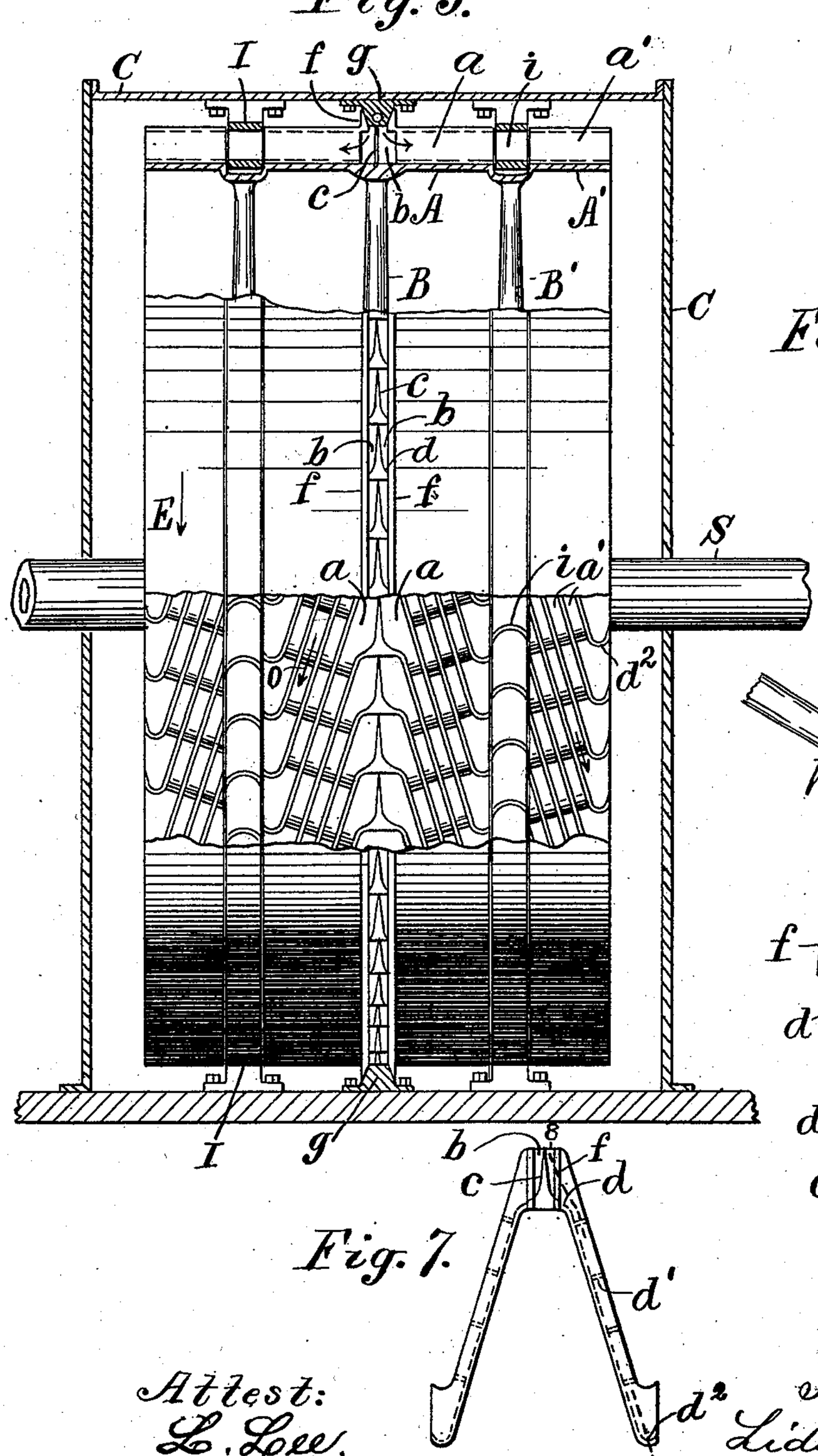

Fig. 6.

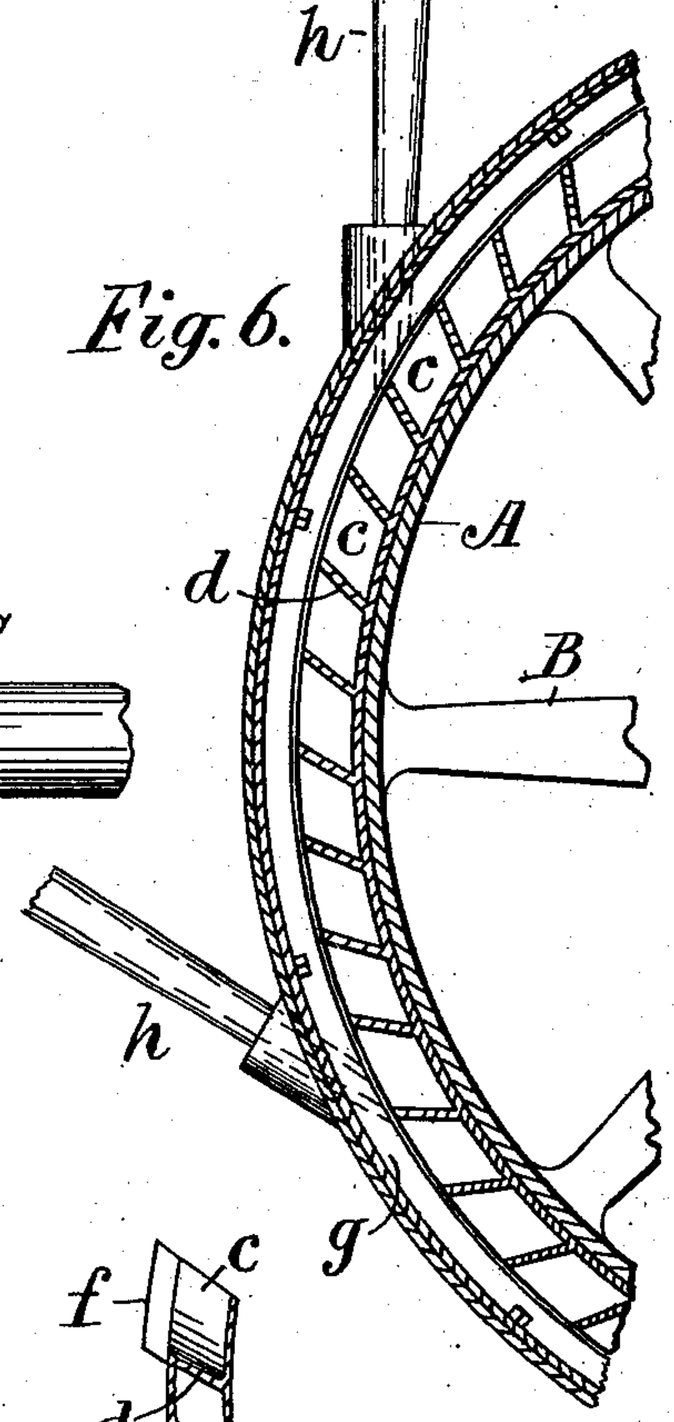

Fig. 7a.

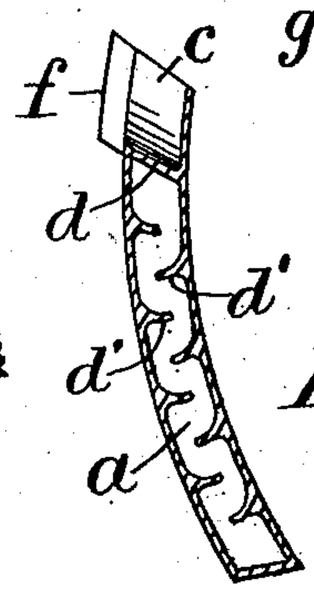

Fig. 7.

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GAS IMPACT ENGINE.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 10.

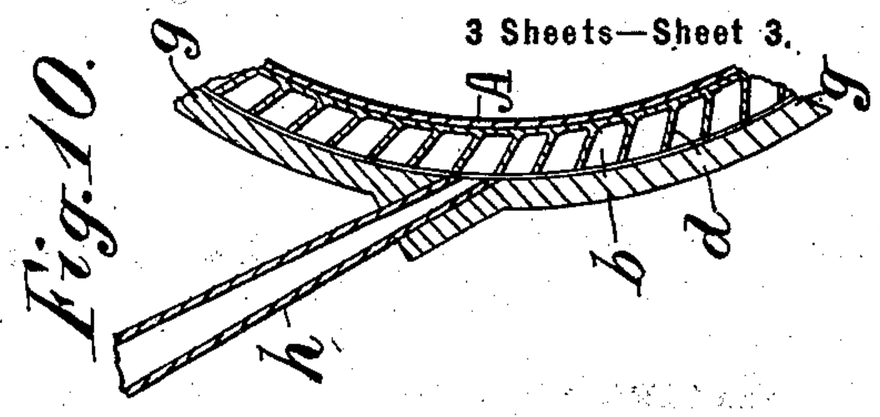


Fig. 9.

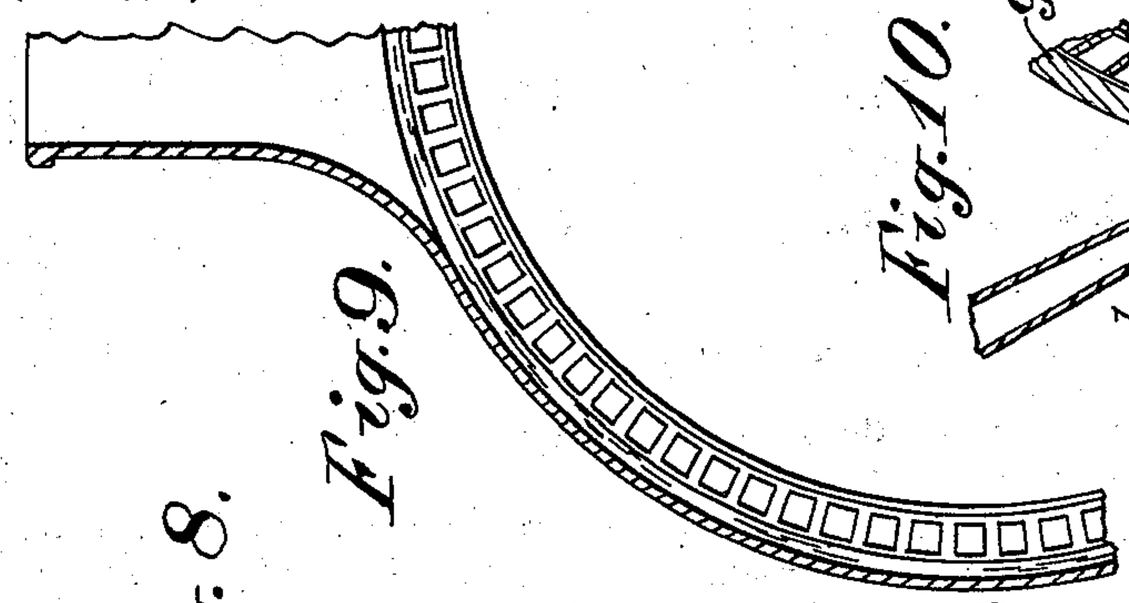
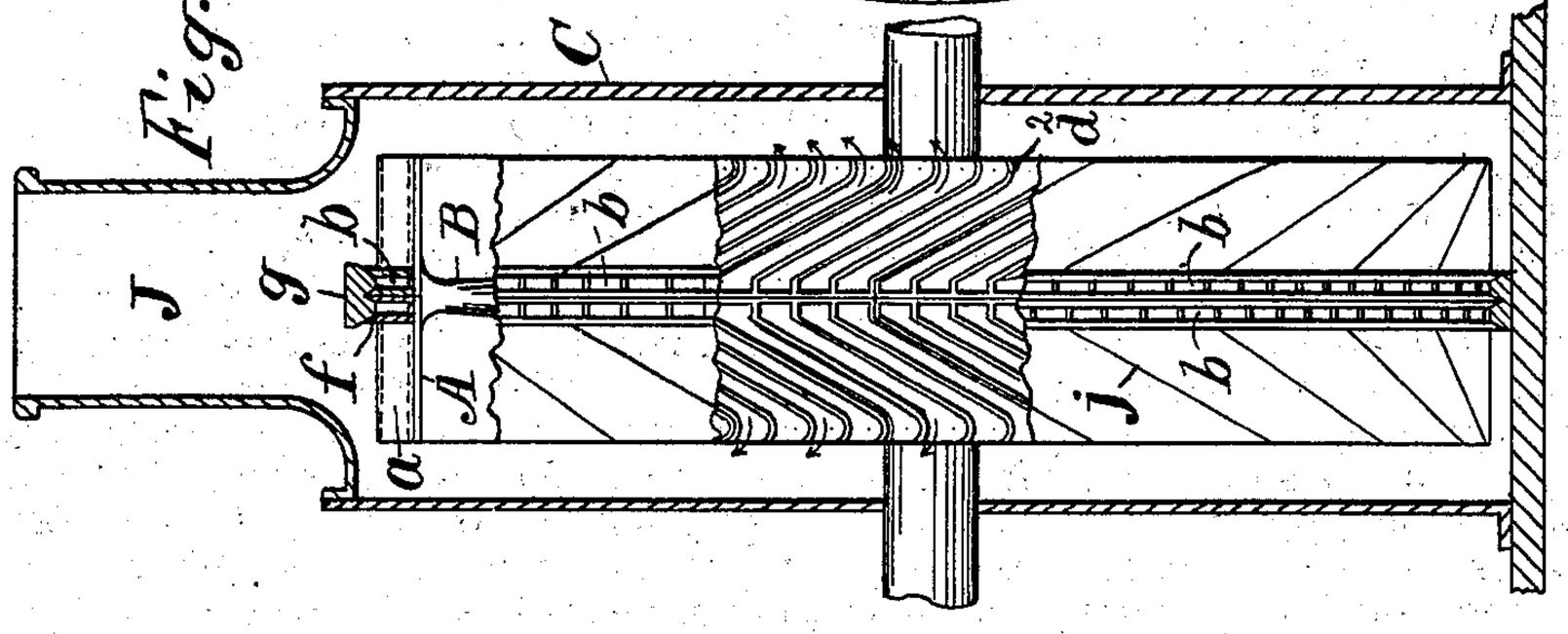


Fig. 8.



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UNITED STATES PATENT OFFICE.

LIDA WILSON, OF BROOKLYN, NEW YORK.

GAS IMPACT-ENGINE.

SPECIFICATION forming part of Letters Patent No. 700,277, dated May 20, 1902.

Application filed August 14, 1901. Serial No. 71,993. (No model.)

To all whom it may concern:

Be it known that I, LIDA WILSON, a citizen of the United States, residing at Pierrepont House, Hicks and Montague streets, Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Gas Impact-Engines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to that class of rotary engines driven by the impact of a gaseous fluid upon resisting-surfaces attached to a wheel; and the object of the invention is to abstract the maximum amount of energy from the fluid used and to utilize it by means of the wheel.

In impact gas-engines in which the periphery of the wheel is provided with a series of channels to receive the gaseous fluid the channels have been formed wholly open upon the surface of the wheel and the gas confined therein by a stationary cover or casing fitted to the wheel's periphery; but such a construction involves either great resistance from friction if the cover or casing be fitted closely to the periphery of the wheel or great loss of effect through the escape of gas if the guard or casing be fitted loosely. To maintain a gas-tight joint between such parts is practically impossible in practice where gas of high pressure and temperature is used, as the temperature tends to warp and expand the channels and the wheel and its casing or guard, so that they cannot be kept perfectly in their original form, but either crowd or clear one another. To avoid the objections to such open channels, my invention provides closed channels upon the periphery of the wheel, with inlets for such channels arranged around the periphery to receive the gas from the same nozzle or nozzles and with outlets upon the edge or edges of the wheel, which I effect by inclining all the channels at a suitable angle to the axis of the wheel and extending them forwardly to their outlets in the general direction of the desired rotation. The interiors of the channels may be provided, as is common, with corrugations or wings to receive the impacts caused by the passage of the fluid therethrough, and thus transmit its energy to the wheel in the direction of its movement. Each pipe near its outlet is reflexed to furnish an additional impact-surface to the escaping gas. A stationary annular guard is fitted to the inlets of the pipes and perforated at one or both points for a nozzle, which throws the jet of gas into the inlets in the general direction of the desired rotation. The gas which enters the inlets is confined by the closed walls of the channels until it escapes from their respective separate outlets. A casing is provided to inclose the wheel, with a clearance between the casing and the moving parts of the wheel, and the casing is provided with an outlet from which the exhaust is discharged. The stationary guard may be fastened to the casing and to the bed-plate at any desired number of points, and the shaft of the wheel is sustained in suitable bearings attached to the bed-plate or casing, so as to hold the wheel firmly concentric with the guard. Where the gas is delivered to the inlets at such a high pressure, or in such great volume that its energy cannot be exhausted by passing through single primary closed channels and acting upon the resisting-surfaces therein, I make the wheel in several transverse sections and provide adjacent to the outlets from the primary closed channels a series of stationary reflexed closed channels to reverse the direction of the escaping fluid and direct it into secondary closed channels attached to a second section of the wheel. In practice I prefer to provide the wheel with the closed channels in pairs set at opposite divergent inclinations upon the periphery, the two channels of each pair having a common inlet, with a partition in such inlet to divide the gas between the two channels and the outlets arranged at the outer ends of the channels upon the opposite edges of the wheel. The closed channels are preferably formed in castings secured upon the periphery of a drum, and each casting may be constructed with a single pair of the channels or with a group of such pairs therein and the castings formed to extend across the drum from the outlet of one channel to the outlet of the opposite channel, the castings being arranged to fit in close contact with one another, so as to wholly cover the periphery of the drum with the channels.

An illustration of the invention is shown in the annexed drawings, in which—

Figure 1 is an end view, and Fig. 2 a side view, of the casing for a wheel in three sections. Fig. 3 is a perspective view of a portion of the central section of such wheel with the guard and portion of the casing in section and the guard-cheeks broken away upon the periphery. Fig. 4 is a perspective view of portion of one ring for one series of deflectors. Fig. 5 is an edge view of the wheel with a section of the casing and the upper edge of the wheel shown in section and the covering-surface of the wheel broken away below the middle to show the adjacent channels. Fig. 6 is a section of a part of the periphery of the wheel and its casing. Fig. 7 is a plan of one of the duplex oppositely-divergent channels, and Fig. 7ª an edge view of the same on line 8 8 in Fig. 7. Figs. 8, 9, and 10 illustrate a wheel having two nozzles adjacent to the central line of the periphery and two sets of pipes inclined divergently from the central line of the periphery toward its edges. Fig. 8 is a view of the same character as shown in Fig. 5 with the channels upon the upper part of the wheel shown in section only at their inlets. Fig. 9 is an elevation of a part of the wheel rim and guard with a section of the casing, and Fig. 10 is a section of part of the wheel rim and guard where the nozzle penetrates the guard.

In Figs. 5 to 7ª, A A′ designate the rim of a drum forming the periphery of the wheel shown attached to the shaft S by arms B′, which shaft is extended outwardly through the casing C and is sustained upon suitable bearings, which would be mounted upon the bed D to center the shaft, although such bearings are not shown, as the invention relates to the construction of the wheel and its special attachments. The wheel is shown with cylindrical periphery, comprising a center section A, sustained by the arms B, and two lateral sections A′, sustained by arms B′. Sectional parts to receive the gas are attached to the cylindrical peripheral drums, forming channels *a* upon the section A and channels *a′* upon the section A′ of the wheel. A single inlet *b* for each pair of channels upon the section A opens outwardly from the periphery of the wheel and connects with two of the channels *a*, which slope outwardly in opposite divergent directions from the inlet and forwardly in the direction of the wheel's desired rotation, as indicated by arrow E. The channels have outlets upon the edges of the section A and are there reflexed to receive further impact from the gases before they escape from the outlets. This arrangement of the channels permits them to be formed in a V-shaped or duplex casting, (shown in Fig. 5,) which contains two of the pipes, which may also be cast in nests of pipes grouped together, so as to lie closely upon the periphery of the wheel when different nests or groups are placed together. The inlet is divided centrally by a tongue *c*, at the base of which upon each side is a shoulder *d* to receive the impact of the gases when first entering the mouth of the pipe-inlets, and the pipes are provided internally with corrugations or wings *d′*, upon which the gas makes repeated impacts, which are in turn transmitted to the pipes and from thence to the wheel, while the reflexed end d^2 of the pipe at the outlet receives an additional impact before the gas escapes from the pipe. All of the impacts are in the general direction of the desired rotation of the wheel, and by the disposition of the pipe upon the cylindrical circumference of the wheel the communication of the energy is wholly in the direction of the desired rotation of the wheel and operates with leverage and steady turning motion upon its shaft. The inlets are shown arranged in a single line upon the periphery of the drum, and a guard-cheek *f* is projected from the exterior of each side of each inlet, as shown in Fig. 7, to fit a stationary guard *g*, which is attached to the casing. Fig. 6 shows the nearer guard-cheek removed, exposing the inlets *b* and the tongues *c* with the mouths of the inlets forming the shoulders *d*. Fig. 3 shows a portion of the guard-cheeks adjacent to the casing C; but the remainder of the cheeks is cut away to expose the inlets. The adjacent surfaces of the guard and the cheeks are shown tapered, and a little clearance is in practice provided between the cheeks and the guard, and their adjacent surfaces are lubricated by suitable means, which means for use with highly-heated gas I have described in another pending application. A nozzle *h* is inserted through the guard to project the gas into the inlets of the pipes, the jet of gas being split by the thin partition or tongue *c*, which throws the gas into each of the two divergent channels *a*, flowing through them toward the opposite edges of the drum-section A, as shown by the arrows upon the inlets in the upper part of Fig. 5. Two nozzles are shown in Fig. 6, arranged upon the same peripheral line, and any desired number may be furnished, according to the pressure and volume of gas desired to be employed and the energy required to be developed by the wheel. The gas when ejected from the nozzles moves in the direction of the wheel's rotation, as indicated by the arrow *o* in Fig. 5, and impacts repeatedly upon the resisting-surfaces *d*, *d′*, and d^2 and imparts its energy to the wheel in the direction of its rotation, (indicated by the arrow E.) With gas of pressure and in volume such that the energy can be exhausted in passing through the primary channels *a* (as I prefer to do) the gas may be permitted to escape at the edges of the primary section of the wheel; but with gas of a high pressure and in great volume I provide the closed reflexed passages adjacent to the outlets of the primary wheel, which act as deflectors to reverse the current of the gases escaping from the reflexed outlets backwardly and turn it forwardly into secondary chan-

nels disposed in the desired direction of rotation. Supplemental or secondary channels a' are fixed upon the secondary wheel-sections A' at the outer edges of the deflectors i, and the gases thereafter pass through the channels a' and impact upon the resisting-surfaces therein until the gases reach the outlets, which are reflexed, as described for the channels a. The deflectors i are arranged between two rings I, which encircle the cylindrical periphery of the wheel between the adjacent ends of the channels a and a', and the rings I are attached to the casing by feet I', as shown in Figs. 4 and 5.

Figs. 8, 9, and 10 show the wheel provided with a single drum, two sets of channels disposed at opposite divergent inclinations upon its periphery having separate inlets arranged contiguous to one another near to the central peripheral line of the drum and the reflexed ends of the outlets at the opposite edges of the drum. With such construction the inlets are provided with four cheeks—one at each side of the inlet for each of the diverging channels—and the two middle cheeks serve as a partition between the channels. The stationary guard is formed with two portions extending between the cheeks to cover the divided parts of the inlets and prevent the escape of gas therefrom after it is delivered thereto by the nozzle h. (Shown in Fig. 10.) The middle cheeks split into two the jet of gas from the nozzle and throw it into the laterally-diverging channels. With such construction the channels at opposite divergent sides of the division between the central cheeks can be formed of castings in nests or groups of pipes, each nested group and casting shown in the drawings embracing four of the channels and the division between such castings being indicated by the lines j upon the exterior of the wheel in Fig. 11.

In all the constructions shown the casing is separated from the drum at the sides and ends to form an exhaust-chamber C', and an exhaust-outlet J is shown upon the casing in some of the figures through which to discharge the exhaust. In Figs. 1 and 2 the casing is shown divided horizontally to permit the application of the guard-rings g to the drum, as well as the rings I, which carry the deflectors i. The guard-rings g and deflector-rings I would in such cases be divided the same as the casing; but such details of construction may be varied without departing from my invention.

I am aware that it is common to project jets of gas into open channels upon the periphery of a motor-wheel and to furnish the channels with guards and casings of various kinds, and I do not, therefore, claim such a construction as my invention. I have pointed out the objection to channels which are open the greater part of their length or upon their sides or tops upon the periphery of the wheel, and thus require a surrounding guard fitted closely to their surfaces to prevent the escape of the gas, and have described my own improvement, in which only a short narrow inlet of the channel is open upon the periphery of the wheel, and the gas after it enters such inlet is wholly confined between the walls of the closed channel until it escapes at the edge of the wheel. This construction avoids friction and loss of the gas and enables it to act more effectively upon the obstructions, as flanges or corrugations, which may be formed in the channels to receive repeated impacts from the gas. I am also aware that the gas after it has been passed from one set of open channels has been conducted to another set upon the periphery of the same drum, and I do not, therefore, claim such repeated use of the gas; but my construction differs from others in having the reflexed intermediate passages formed between the two rings I by the bent curved deflectors i to reverse the direction of the gases, which are directed backwardly in their escape from the outlets of the primary channels and require to be turned forwardly to operate in the secondary channels in the desired direction of rotation. Such closed reflexed passages may be formed in a stationary casting, and thereby conduct the gas without such leakage as occurs when the channels or the guards surrounding the same are in motion. My invention will thus be readily distinguished from that class of constructions to which I have referred and which I hereby disclaim.

Having thus set forth the nature of the invention, what is claimed herein is—

1. A gas impact-wheel having a series of numerous closed channels upon its periphery disposed in the general direction of its desired rotation, the channels having inlets arranged upon the periphery and outlets upon the edge of the wheel, and a nozzle arranged upon said periphery to project gas into the inlets, substantially as herein set forth.

2. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the periphery, and outlets upon the edges of the wheel, and one or more nozzles arranged around said periphery to project gas into the inlets, substantially as herein set forth.

3. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the periphery, and outlets upon the edges of the wheel, a stationary guard over the inlets and one or more nozzles inserted through the guard around the said periphery to project gas into the inlets.

4. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the periphery, and outlets upon the edges of the wheel reflexed

to present additional impact-surfaces to the escaping gas.

5. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the same peripheral line, and outlets upon the edges of the wheel, one or more nozzles arranged around said peripheral line to project the gas into the inlets, and the channels being formed in sectional parts extended from one edge of the wheel to the other, said parts being adapted to fit together upon the surface of the wheel.

6. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the same peripheral line, and outlets upon the edge of the wheel, one or more nozzles arranged around said peripheral line to project gas into the inlets, and the channels being formed in castings extended from one edge of the wheel to the other and curved at their outlets to reflex the movement of the escaping gas.

7. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the same peripheral line, and outlets upon the edges of the wheel, one or more nozzles arranged around said peripheral line to project gas into the inlets, and the channels being arranged in pairs with a common inlet at their junction, and the partition *c* in such inlet to divide the gas projected therein.

8. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the same peripheral line, and outlets upon the edges of the wheel, one or more nozzles arranged around said peripheral line to project gas into the inlets, the channels being arranged in pairs with a common inlet at their junction, the partition *c* in such inlet formed with the shoulder *d* at each side, and the divergent portion of each channel extending from such shoulder forwardly in the direction of the desired rotation.

9. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the same peripheral line, and outlets upon the edges of the wheel, one or more nozzles arranged around said peripheral line to project gas into the inlets, the channels being arranged in pairs with a common inlet at their junction, the partition *c* in such inlet formed with the shoulder *d* at each side, the divergent portion of each channel extending from such shoulder forwardly in the direction of the desired rotation, and the outlet of the channels upon the edges of the wheel being reflexed, substantially as and for the purpose set forth.

10. A gas impact-wheel formed with the drum-sections A and A′ having the closed channels *a* and *a′* formed thereon as set forth, the channels *a* being disposed at opposite divergent inclinations to the center line of the drum A and curved backwardly at their outer ends, and the channels *a′* being inclined and extending from one edge across and upon the periphery of the drums A′, the rings I sustained between the adjacent ends of the channels *a* and *a′* with the intermediate curved deflectors *i* therein forming closed reflexed passages adapted to reverse the movement of the gases as set forth, a guard surrounding the inlets of the channels *a* situated around the periphery upon the center line of the drum A, and one or more nozzles extended through such guard to supply the channels with the gases.

11. A gas impact-wheel having two series of numerous closed channels disposed at opposite divergent inclinations upon its periphery in the general direction of its desired rotation, with inlets arranged upon the same peripheral line, and continuous annular guard-cheeks *f* projected at the exterior sides of the inlets, with a stationary guard *g* attached to the casing and fitted between the cheeks *f*, and one or more nozzles extended through such stationary guard to supply the inlets with the gases.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LIDA WILSON.

Witnesses:
THOMAS S. CRANE,
WALTER H. TALMAGE.