

(No Model.)

2 Sheets—Sheet 1.

G. E. GILHAUS & J. A. RICHTER.
GAS PURIFYING APPARATUS.

No. 525,072.

Patented Aug. 28, 1894.

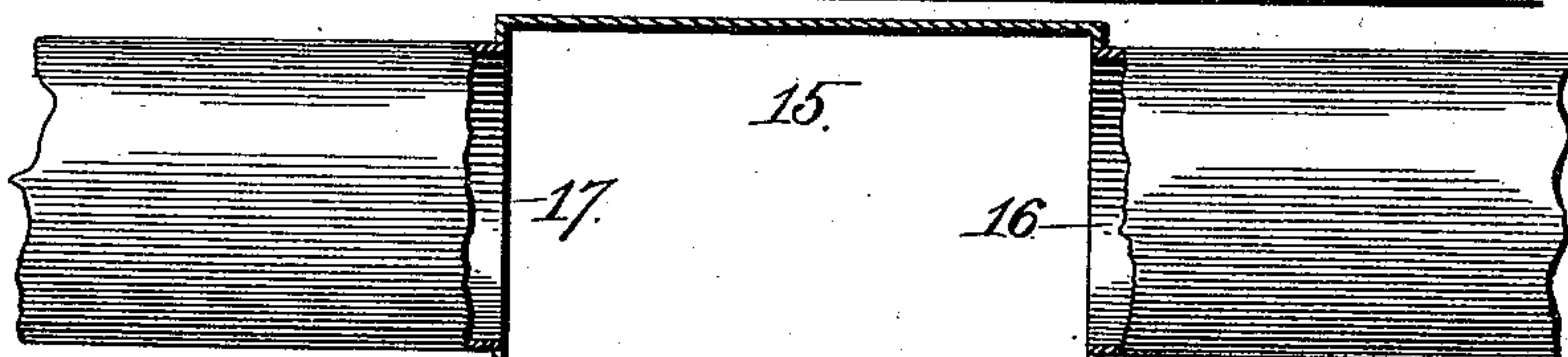
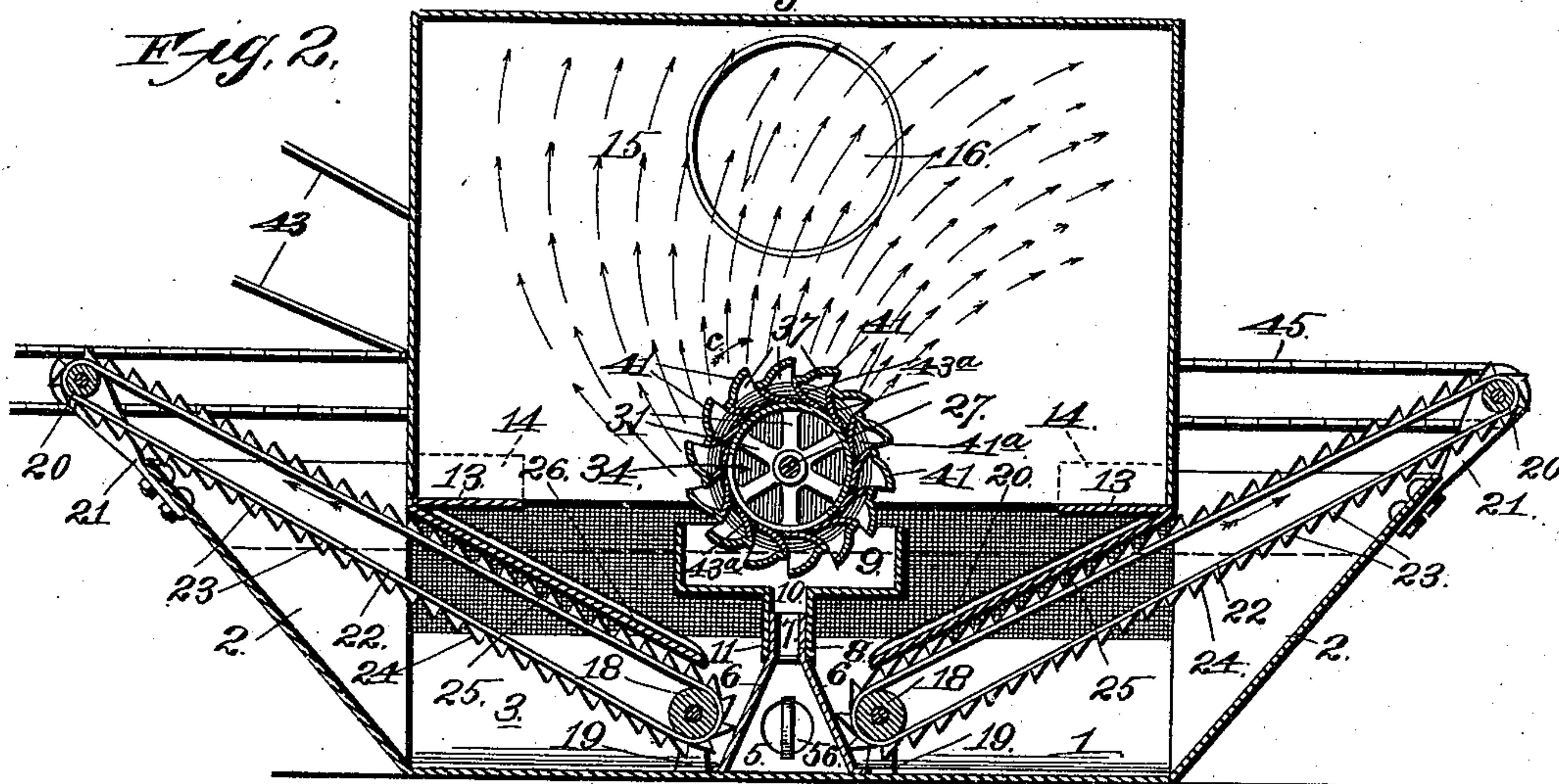
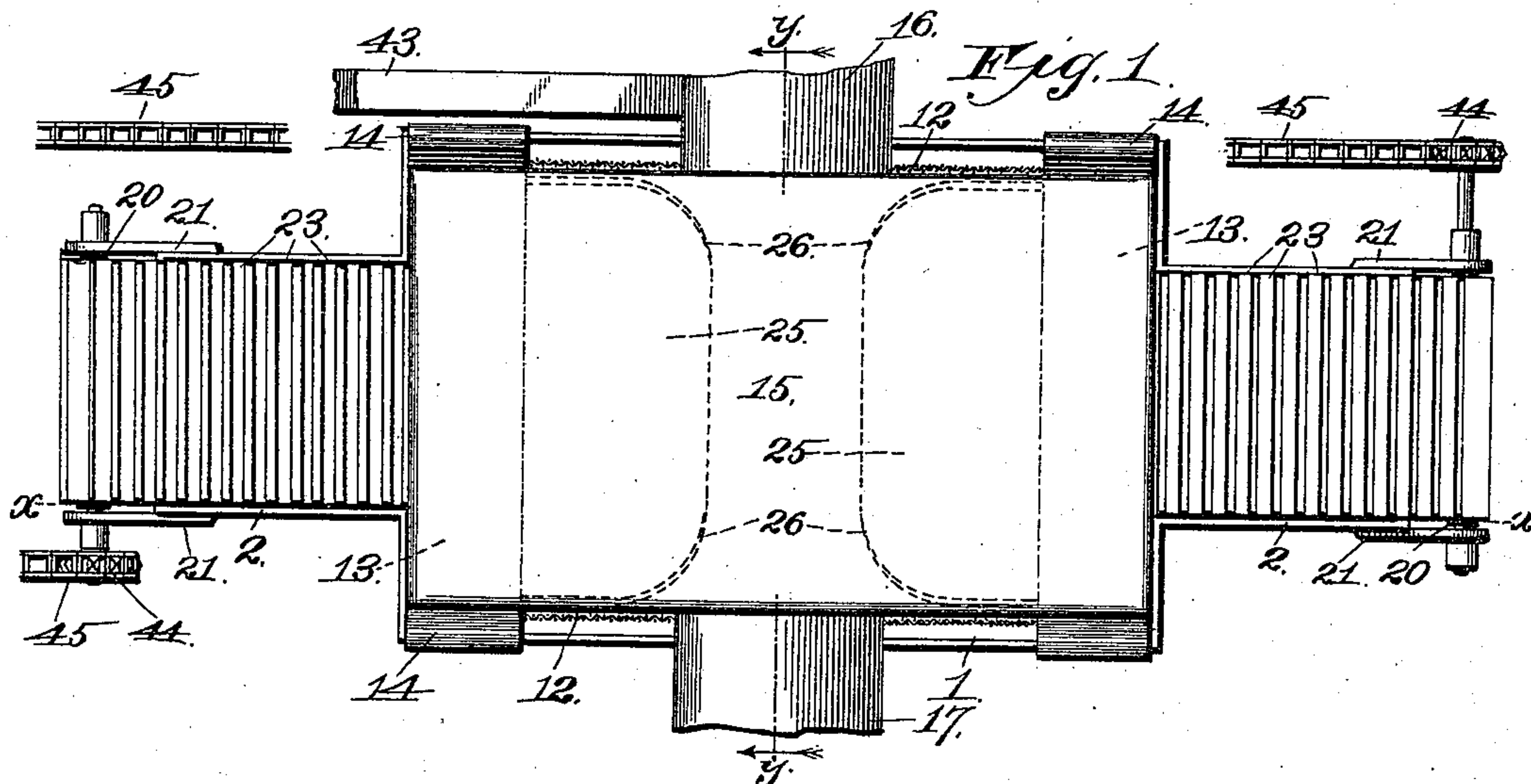


Fig. 3.

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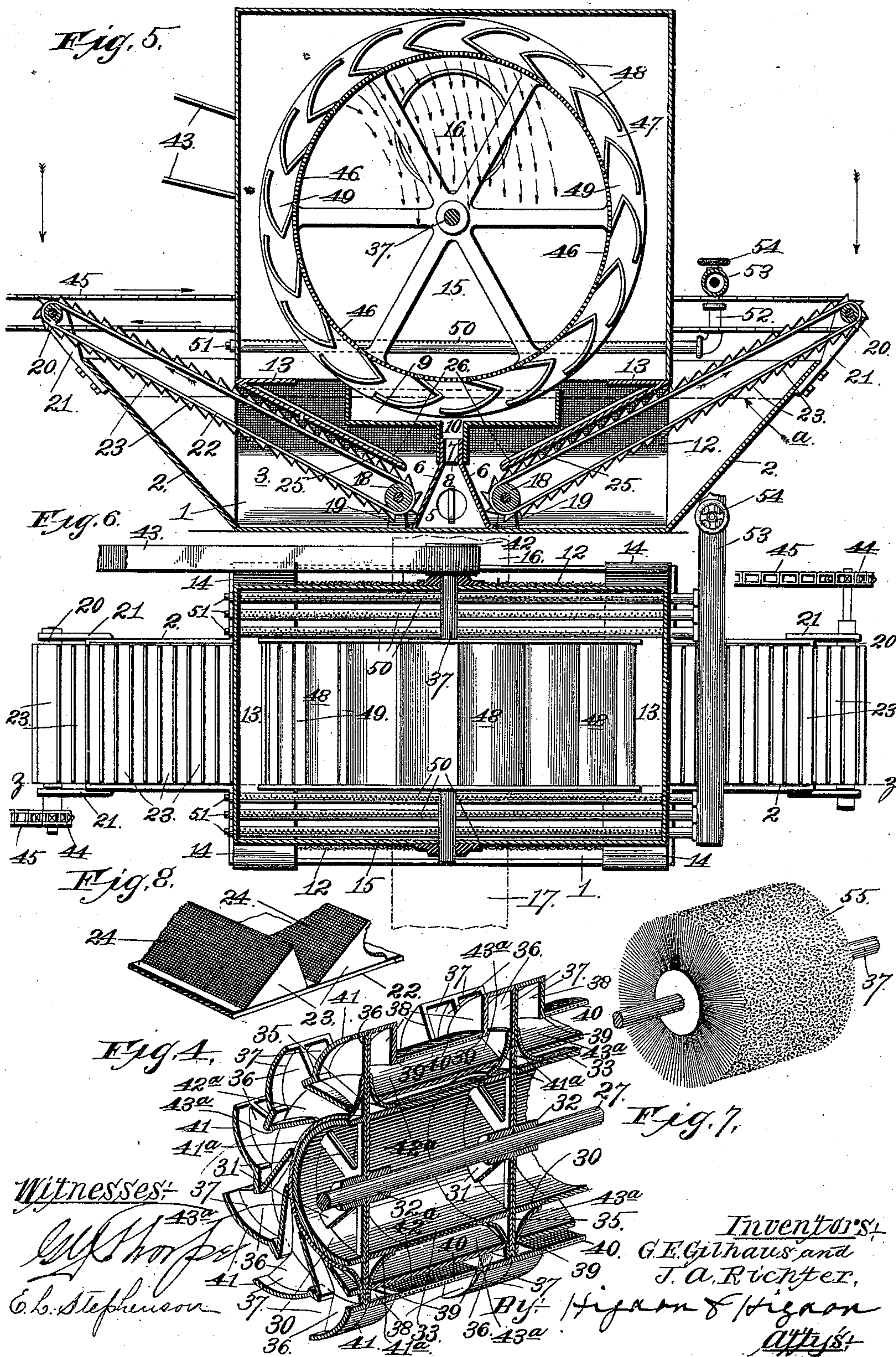
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2 Sheets—Sheet 2.

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GAS PURIFYING APPARATUS.

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UNITED STATES PATENT OFFICE.

GEORGE E. GILHAUS AND JOHN A. RICHTER, OF KANSAS CITY, KANSAS.

GAS-PURIFYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 525,072, dated August 28, 1894.

Application filed January 19, 1894. Serial No. 497,345. (No model.)

To all whom it may concern:

Be it known that we, GEORGE E. GILHAUS and JOHN A. RICHTER, of Kansas City, Wyandotte county, Kansas, have invented certain new and useful Improvements in Gas-Purifying Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to gas purifying apparatus and has for its object to produce an apparatus of this character, which will thoroughly and effectively remove all impurities from the gas and at the same time automatically collect, convey into, and discharge all such impurities in suitable receptacles placed for the purpose.

In the manufacture of fuel gas, previous to our invention, there has been no effective apparatus for purifying the gas, so as to obtain in the use of the gas, the best results. Our invention effectively accomplishes this purpose. Furthermore, as is well known, in smelting valuable ores, such as gold and silver, an enormous quantity of the metal in the shape of flakes and dust, is lost beyond recovery in the course of a few months; being carried off by the blast, and discharged from the smoke-stack of the furnace. To separate these flakes and particles from the blast, collect, convey and deliver them to suitable receptacles for the purpose, this apparatus is particularly designed, and that it thoroughly accomplishes its purpose of creation, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a top plan view of an apparatus constructed in accordance with our invention. Fig. 2 is a vertical section taken on the line X—X of Fig. 1. Fig. 3, is a vertical transverse section taken on the line Y—Y of Fig. 1. Fig. 4, is a sectional perspective view of the spray-wheel shown in Figs. 2 and 3. Fig. 5 is a vertical section taken on the line Z—Z of Fig. 6. Fig. 6 is a horizontal section of the apparatus shown in Fig. 5, and showing the spray-wheel therein, in elevation. Fig. 7, is a detailed perspective view of a modified form of spray-wheel. Fig. 8, is a detailed perspective view of a portion of one of

the endless carriers, to show more clearly the construction of the buckets carried thereby.

Referring to the drawings, where similar numerals and letters refer to corresponding parts in all the figures: 1 designates a tank or receptacle, which is preferably of rectangular form, and this tank is preferably reduced or narrowed at each end, (but not necessarily so) as shown at 2—2.

Arranged longitudinally within and resting upon the bottom of the tank, are the upwardly divergent partitions 3—3, to form the similar chambers 4—4; the upper sides of which are open.

A transverse passage, 5, is formed centrally of the tank, by means of the upwardly converging walls 6—6, and this passage communicates at each end, through openings in the partitions, 3—3, with the chambers 4—4.

A vertical passage, 7, communicating with the passage 5, is formed by the annular flange, 8, rising from the upper end of the walls, 6.

A box, 9, preferably rectangular in form, is provided with an opening, 10, in its bottom, and depending marginally from said opening is an annular flange, 11, which surrounds or embraces the flange, 8, so as to be supported thereby in a horizontal position. The object of this box will be presently explained.

Arranged parallel within the tank, and having their lower ends secured to the upper margin of the inclined partition, 3, are the screens, 12, preferably of wire, and with their interstices very fine, so as to prevent the passage therethrough with the water, of even the smallest foreign particles.

Extending transversely of the tank near each end, is a plate, 13, and these plates are provided with hooks, 14, at each end, which engage and rest upon the upper margin of the sides of the tank. A cover, 15, of size and form to fit within the body-portion of the tank, is supported upon the plates, 13, and communicating with the interior of the cover, is the inlet pipe or conduit, 16, which leads to a smelting furnace, (not shown) and the outlet-pipe or conduit, 17, which leads to a smoke-stack, not shown.

Arranged horizontally and adjacent to each wall, 6, of the passage, 5, is a transversely extending roller, 18, and the spindles of these

rollers are journaled in bearing brackets, 19, secured to the bottom of the tank. Arranged parallel with these rollers, and a slight distance above and beyond the ends of the tank is a pair of rollers, 20, and the spindles of the rollers, 20, are journaled in bearing brackets, 21, which are bolted or otherwise rigidly secured to the tank. Connecting each pair of rollers, is an endless and flexible belt or carrier, 22, and these carriers are provided with buckets or chambers, 23, which are adapted, as hereinafter explained, to collect, convey and discharge the particles foreign to the gas, into suitable receptacles placed to receive them. The bottoms, 24, of these buckets are formed of perforated or foraminous material so as to allow the water to escape therefrom, and not be conveyed from the tank with the particles foreign to the gas and water. From this arrangement of the endless carriers, it will be seen they extend divergently upward, and in order that descending particles, such as flakes of metal, may be caught by the endless carrier, are provided the downwardly converging guide-plates or deflectors, 25; these plates or deflectors being preferably formed integral with the transverse supporting plates, 13. These plates, 25, correspond in width to the interior of the cover, 15, and a suitable distance from their lower end, converge forward to correspond in width to the endless carrier, and the plates at their side margins are provided with guide-flanges, 26.

A quantity of water is introduced into the tank in any suitable manner, and flows through the screen, 12, fills the chambers, 4, and seeks its level, *a*, by way of the passages, 5 and 7, in the water-box, 9; thus it will be seen that only purified water has access to the water-box.

A spray-wheel is mounted rigidly upon the shaft, 27, which extending transversely and centrally of the tank and cover, finds a journal in the upper margin of the sides of the tank as shown at 28; the shaft, also passing through holes or apertures, 29, in the sides of the cover. This spray-wheel is constructed as follows: A number of bands, 30, three in this instance, are provided with spokes, 31, and their hubs, 32, are keyed or otherwise rigidly secured upon the shaft, 27. These bands are now rigidly connected by the rings, 33, so as to form, practically a continuous and single tube, the opposite ends of which are closed by heads or end-plates, 34, so as to prevent the access of water to the interior of said tube. These rings, 30, for convenience in putting the spray-wheel together, are cast in two similar sections, and are secured together in any suitable manner and extending centrally and in a vertical plane from the outer side of each of said rings, 30, is a circular and continuous flange, 35. This flange is marginally notched to form the partitions, 36, which form the inner side of a pair of cups, 37, the opposite or outer sides, 38, of which are parallel

with said partitions and extend inwardly nearly half way toward the outer side of their respective rings, 30, and terminate in a continuous flange, 39. The adjacent flanges, 39, of each oppositely disposed pair of rings are connected by a band, 40, of foraminous material. The outer wall of each pair of cups converges rearwardly to form a junction with the inner end of the mouth of the next successive pair of cups as shown as 41.

From the foregoing, it will be seen that any water entering the mouth of the cups will pass upon opposite sides of the flange 35, and in order to deflect the water away from said flange, 35, or beneath the foraminous band, 40, a pair of annular deflectors, 41^a, arranged to converge downwardly, are located at opposite ends of the passage beneath the said foraminous band.

In order to properly accomplish the object of the spray-wheel, which will appear hereinafter in the description of the operation, the space between the flanges, 35, the inner band, 33 and the foraminous outer band, 40, is divided into a number of chambers, 42^a, which have each two entrances or supply cups, by means of the inclined partitions, 43^a, which extend from one deflector to the other, and from the outer side of the band, 33, to the junction point of the wall, 41, of one cup, with the inner end of the mouth of the next succeeding cup.

In order to rotate the spray-wheel rapidly, the wheel, 42, upon the end of the shaft, 37, is connected through the medium of the belt, 43, with an engine or counter-shaft, not shown.

In order that the endless carriers may travel slowly in the direction of the arrows, the sprockets, 44, upon the spindles or rollers, 20, are connected through the medium of the chains, 45, with a counter-shaft or other suitable motive power not shown.

The operation of the apparatus described is as follows: Motion is imparted to the belt, 43, to rotate the spray-wheel rapidly in the direction of the arrow, "*c*," Fig. 2, and at the same time motion is imparted to the carriers or conveyers. This operation of the wheel causes the cups thereof to successively pass through and gather up a quantity of water from the water-box, 9, and as soon as the full cups emerge from the water in the box, it, by reason of the deflectors, 41^a, is directed toward the center of its respective chamber, 42^a, and beneath the foraminous outer band, 40. By the time the water reaches this position the momentum of the swiftly rotating wheel discharges or throws it violently forward and through the foraminous outer band, 40, so as to form or provide a continuous spray, which striking against the roof of the cover 15, descends by reason of gravity upon the inclined guide-plates, 25. As this spraying action of the water takes place, the gases or other products of combustion from the smelting furnace is conveyed by means of the inlet-pipe 16, to the interior of the apparatus, and is

subjected to the spray of the water thrown by the swiftly revolving wheel. This action of the water purifies the gas by removing all flakes of metal therefrom and causes said flakes to fall with the water upon the guide-plates, 25, by which they are conducted and discharged into the successively presented cups of the slowly traveling carriers. By providing these cups with the foraminous bottoms, the water is allowed to escape as hereinbefore explained, and the flakes of metal and other foreign substances are conveyed to the upper end of the carriers and from thence discharged into any suitable receptacle placed for the purpose. The gas, thus purified by the spraying action of the water, of all the foreign substances escapes from the apparatus by way of the outlet pipe, 17, which leads to the smoke-stack.

Referring to Figs. 5 and 6, I show a slightly modified arrangement and construction of the spray-wheel. In this instance, the spray-wheel shaft, 37, is journaled in the cover 15, a considerable distance from its lower margin and the spray-wheel mounted thereon, is much larger diametrically than the wheel already described. In this instance, the ends of the wheel are not closed, and the periphery is formed of metal and finely perforated as shown at 46, or may be formed of any other suitable foraminous material, and has annular flanges projecting outwardly from each side margin.

Secured rigidly to the periphery, and extending from the inner side of one flange, 47, to the inner side of the other, are a number of approximately V shaped plates, 48; these plates forming in conjunction with the periphery and flanges of the wheel, a series of circumferentially arranged water-cups, 49, and the perforated portion of the periphery of the wheel forms the base or bottom of the cups. With a wheel of this construction, it will be seen that the cups, 49, successively passing through the water-box, 9, will elevate said water without discharging the same until a position considerably above the axis of the shaft is attained. Immediately the cups reach this position, the water is sprayed through the foraminous base or bottom of the cups, in the direction of the arrows, Fig. 5, and will thus subject the gases entering the inlet-pipe, 16, to a very thorough spraying operation, the effect of which will be to separate all foreign particles therefrom, as before described.

In order to still more effectually and thoroughly spray the products of combustion from the furnace, two series of perforated pipes, 50, extending longitudinally of the cover, and one at each side of the spray-wheel as shown clearly in Figs. 5 and 6, are provided. These pipes, 50, are closed at one end by removable plugs, 51, and are connected at their opposite ends through the medium of the couplings 52, to the supply-pipe 53, through which the

water passes under pressure, and this supply-pipe is controlled by a valve, 54. It will appear from this construction that the water forced through the pipe, 53, and into the pipes, 50, under pressure, will be sprayed vertically upward, and assist the water from the spray-wheel in thoroughly removing all foreign particles from the gas. These longitudinally arranged spray-pipes, 50, may also be used in connection with the spray wheel as shown in Figs. 2, 3 and 4, if found necessary or desirable.

When the apparatus described is used only for purifying fuel gas, and not for the purpose of saving the foreign particles or substances extracted therefrom, a spray-wheel, 55, in the form of a cylindrical brush, made of wire or bristles will be found, it is believed, to possess advantages over the spray-wheels before described, not only because of the cheapness of the wheel but because such a wheel is absorptive, will discharge a heavier and larger quantity of water, and thereby subject the gas to a more thorough purification.

In order to remove any accumulation of water or foreign substances from the chambers, 4, and the passage, 5, the tank 1, is provided at the opposite ends of said passage, with hand-holes which are normally closed by removable plates, 56. A drain-pipe controlled by a valve, may also be employed to discharge from or supply water to the tank, if desired.

From the above description, it will be seen that we have produced a gas purifying apparatus which will thoroughly and effectively remove all impurities and foreign substances from the gas, and at the same time, automatically collect, convey and discharge all such foreign substances into suitable receptacles placed for the purpose. It will be seen further that we have produced an apparatus of this character which is comparatively simple and inexpensive of construction.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a gas purifying apparatus, the combination with a water tank, a cover therefor, and inlet and outlet-pipes communicating with the interior of said apparatus, and a spray-wheel mounted in said apparatus, and partially submerged at all times, of a pair of endless carriers, provided with buckets having foraminous bottoms, substantially as and for the purpose set forth.

2. In a gas purifying apparatus, the combination with a water tank, a water-box therein, and screens arranged to allow the water to flow freely from the tank into the water-box, but to prevent the passage therewith of foreign particles to said water-box, a cover supported above the tank, and inlet and outlet-pipes communicating with the interior of said apparatus, of a spray-wheel mounted therein,

and partially submerged in the water of the water-box at all times, and means to rotate said wheel, substantially as set forth.

3. In a gas purifying apparatus, the combination with a tank, a cover therefor, and inlet and outlet pipes communicating with the interior of the apparatus, of internal partitions forming side compartments, a middle compartment communicating with the side compartments, a water-box above and communicating with the middle compartment, and a spray-wheel partially submerged in the water in the water-box, and means to rotate the same, substantially as set forth.

4. In a gas purifying apparatus, the combination with a tank, a cover therefor, inlet and outlet pipes communicating with the interior of the apparatus, side compartments having open upper ends, and formed by internal partitions, and screens arranged to prevent the access of particles foreign to water, to the said compartments, of a cross-passage connecting the side compartments, a water-box communicating with the said passage, and a rotating spray-wheel having a portion of its periphery submerged at all times in the water of the said box, substantially as set forth.

5. In a gas purifying apparatus, the combination with a tank, a cover therefor, and inlet and outlet pipes communicating with the

interior of the apparatus, of a spray-wheel, comprising a closed inner cylinder, an external cylinder of foraminous material, and peripheral cups communicating with the space between said cylinders, substantially as set forth.

6. A spray-wheel, comprising a closed inner cylinder, an external cylinder of foraminous material, partitions dividing the space between the said cylinders into distinct compartments or chambers, and peripheral cups to gather up water, communicating with said compartments, substantially as set forth.

7. A spray-wheel, comprising a closed inner cylinder of imperforate material, an external cylinder of foraminous material, peripheral cups to gather water communicating with the opposite ends of the space between the said cylinders, deflectors at each end of said space and inward of said cups, and inclined partitions dividing the space between the cylinders into separate and distinct compartments or chambers, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE E. GILHAUS.
JOHN A. RICHTER.

Witnesses:

G. Y. THORPE,
M. R. REMLEY.