

No. 706,431.

Patented Aug. 5, 1902.

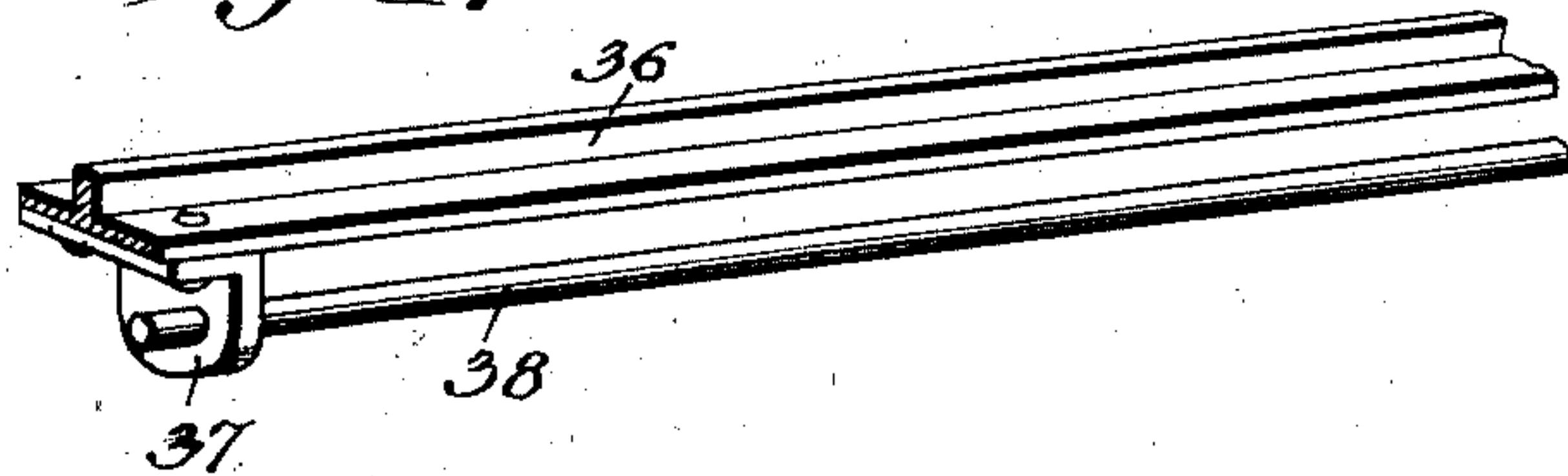
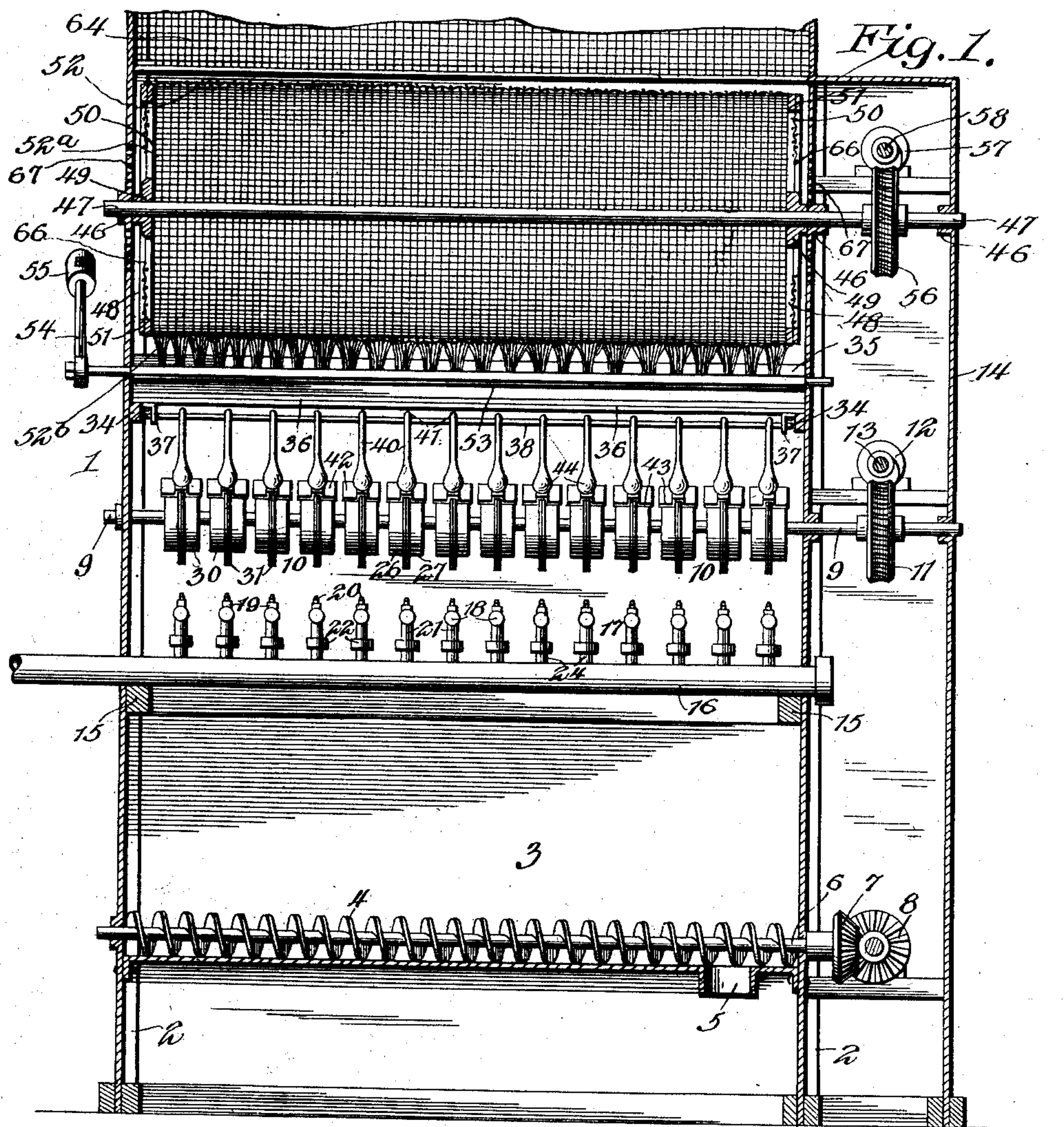
J. H. MANN.

APPARATUS FOR MAKING LAMPBLACK.

(Application filed June 27, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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By

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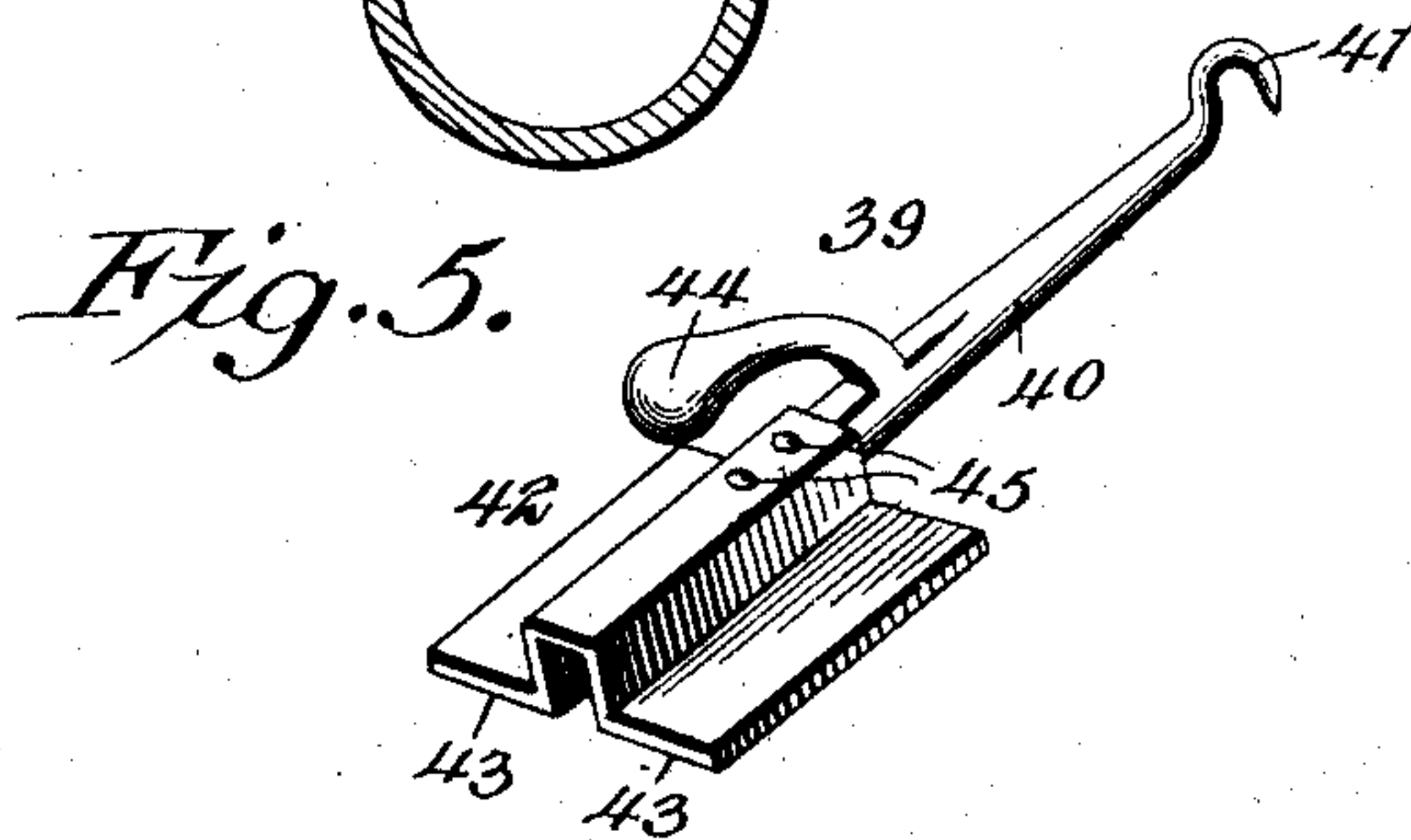
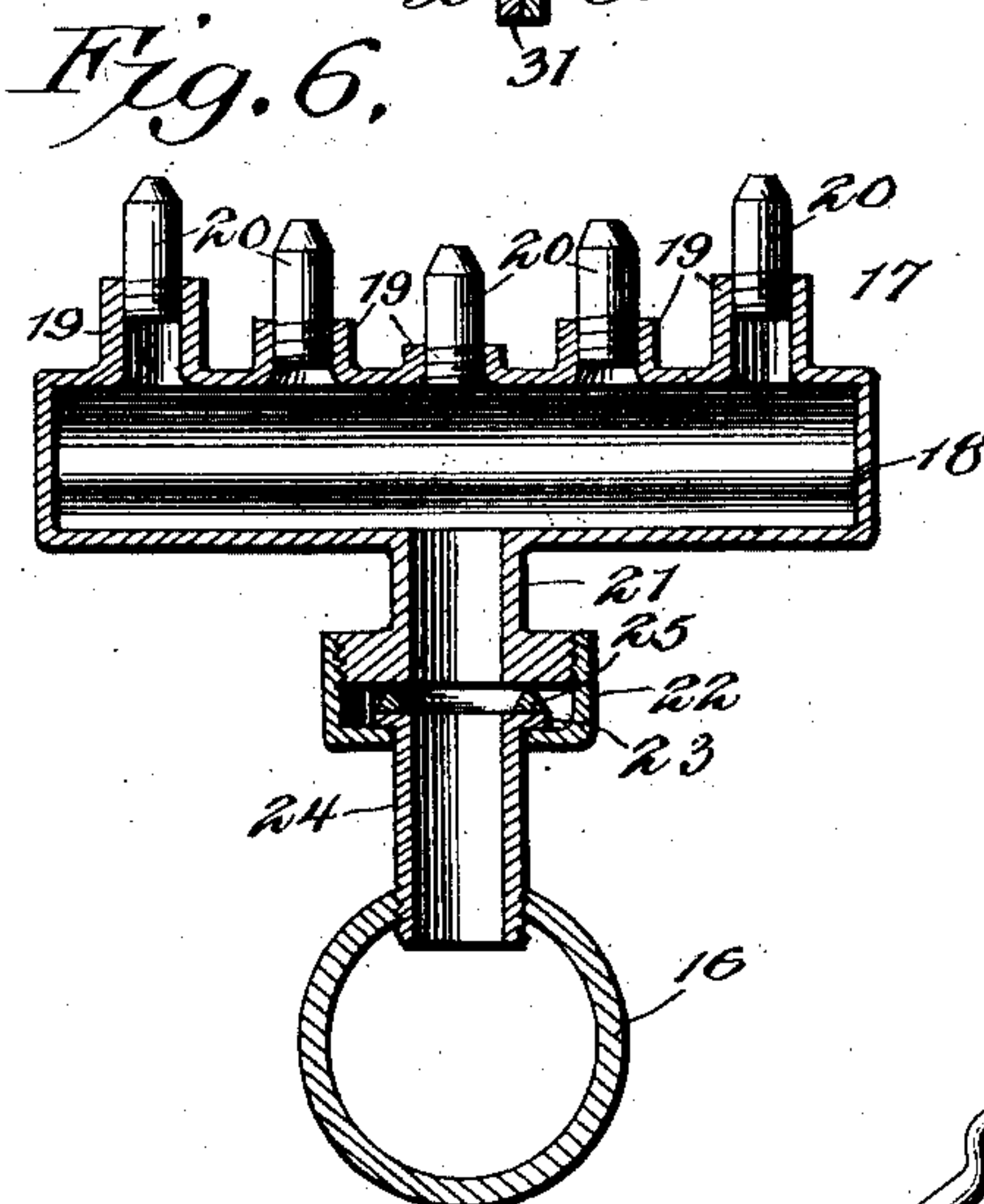
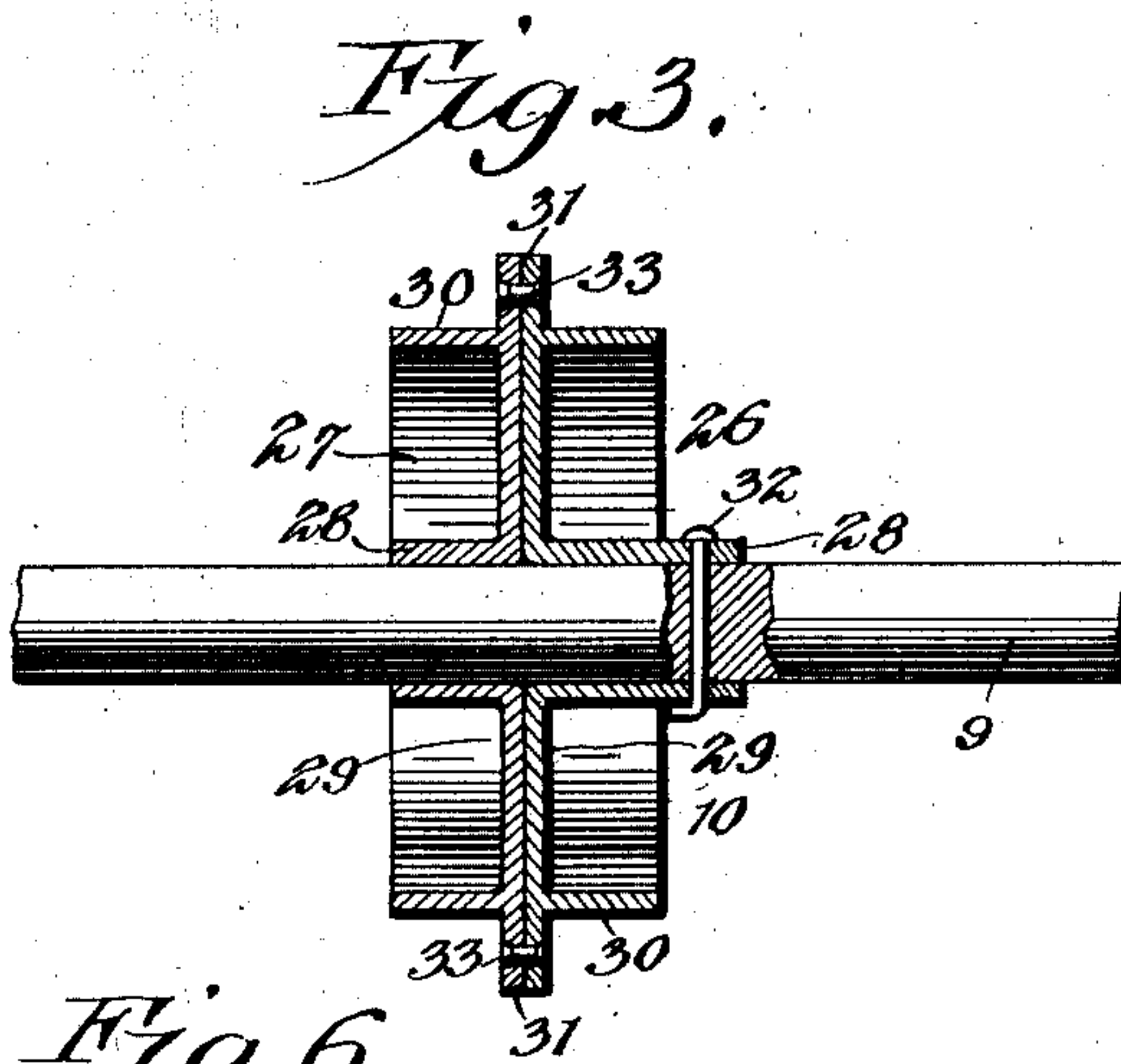
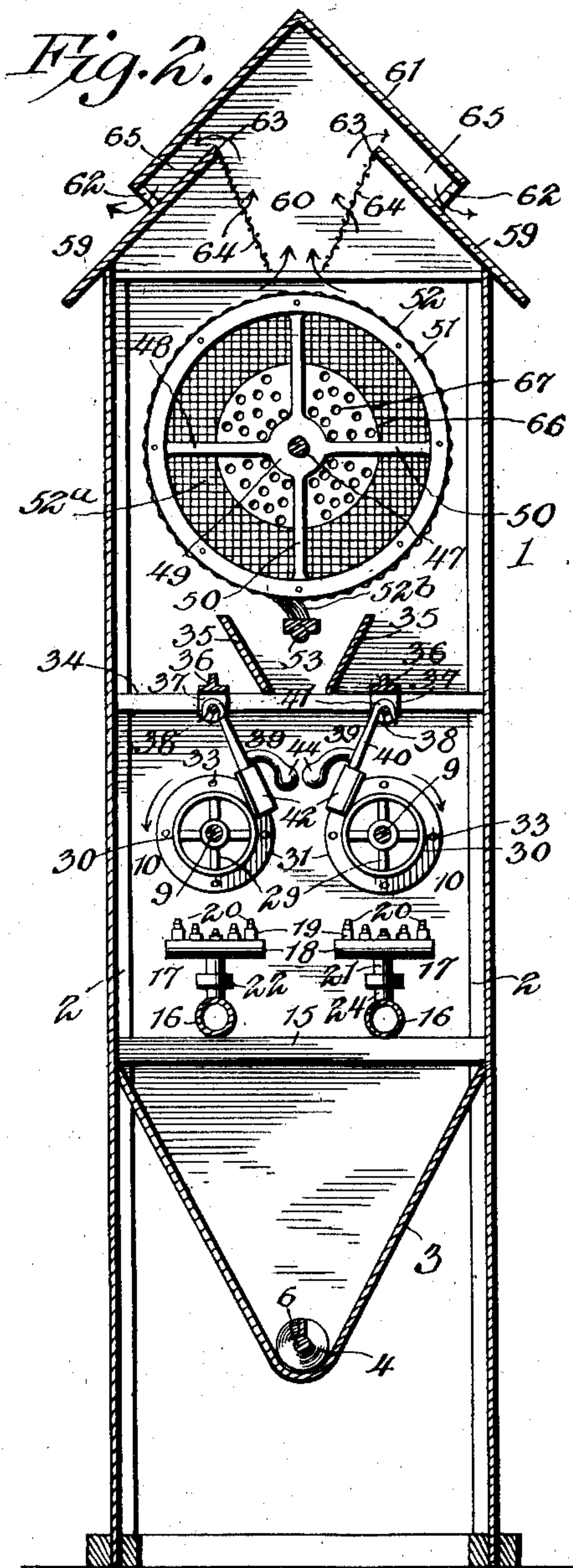
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APPARATUS FOR MAKING LAMPBLACK.

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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JOHN HENERY MANN, OF MEADVILLE, PENNSYLVANIA, ASSIGNOR TO THE
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APPARATUS FOR MAKING LAMPBLACK.

SPECIFICATION forming part of Letters Patent No. 706,431, dated August 5, 1902.

Application filed June 27, 1901. Serial No. 66,300. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENERY MANN, a citizen of the United States, residing at Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Apparatus for Making Carbon-Black, of which the following is a specification.

This invention has for its object in a ready, expeditious, and thoroughly-practical manner to produce, with a given volume of gas or other carbon-producing agent, the maximum amount of high grade of carbon-black.

The apparatus of the present invention is designed as an improvement in certain particulars on a carbon-black-making machine constituting the subject-matter of a pending application filed by me April 26, 1901, Serial No. 57,567, the improvements in the present invention over that presented in the said application relating more particularly to the arrangement of the gas-burners and the construction and operation of the carbon-collecting wheels, the collecting-wheel scrapers, and the carbon-collecting cylinder. Other minor points of the present apparatus are differentiated from the device of the application referred to, but those indicated are salient and sharply define the two inventions.

A further and salient object of the present invention is to provide a novel form of gas-burner by which accumulation of carbon upon the burner-tips will be effectually obviated, thereby rendering it unnecessary frequently to have to clean the burners.

A further object is to improve the construction of the carbon-collecting wheels in such manner as to render them thoroughly effective for producing a high grade of carbon-black and practically to prevent the formation of gray or burnt carbon-black, which is worthless from a commercial standpoint and deteriorates the quality of the carbon-black produced.

A further object is to provide an improved form of collecting-wheel scraper, the same being constructed and associated with the carbon-collecting wheels in such manner as to prevent the presentation of an obstacle to the free discharge of the carbon from the scrapers into the receiving-chute.

A further object is to provide a novel form of collecting-cylinder, the same to catch and retain the bulk of carbon-black escaping the carbon-collecting wheels, the cylinder to be of such construction as to permit free passage therethrough of heated air, thereby operating to keep the temperature of the apparatus at a low degree, and thus hasten the formation of carbon-black.

A further object is to combine with the collecting-cylinder suitable screens which operate to catch and retain any small amount of carbon-black that escapes the collecting-cylinder, the carbon-black collected by these screens being discharged automatically from the top of the structure down to the receiving-chute.

With these and other objects in view, as will appear as the nature of the case is better understood, the invention consists in the novel construction and combination of parts of an apparatus for making carbon-black, as will hereinafter be fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like numerals of reference indicate corresponding parts, I have illustrated a form of embodiment of apparatus capable of carrying my procedure into effect, it being understood that the apparatus herein displayed may be changed as to arrangement, proportion, and general shape of the parts without departing from the spirit of the invention, and in these drawings—

Figure 1 is a view in sectional elevation of an apparatus constructed in accordance with the invention. Fig. 2 is a view in vertical transverse section. Fig. 3 is an enlarged detail sectional view of one of the carbon-collecting wheels. Fig. 4 is a detached detail view in perspective, exhibiting one of the scraper-bearings and a T-rail, upon which the same is supported. Fig. 5 is a view in perspective showing the construction of one of the scrapers. Fig. 6 is an enlarged detail view in section of the gas-burner.

Referring to the drawings and to Figs. 1 and 2 thereof, 1 designates generally the casing of the apparatus, the same being con-

5 constructed of any suitable material, preferably
 of sheet metal, suitably bolted or otherwise
 secured to uprights 2, which, for the purposes
 of strength and safety from fire, are prefer-
 10 ably metallic I-beams or T-beams, as may be
 preferred. The casing is provided through-
 out its length near its lower portion with a
 hopper 3, in which works a conveyer-worm 4,
 one end of the hopper being provided with a
 15 chute 5, down which carbon-black escapes to
 a place of collection. The shaft 6 of the
 worm is suitably journaled in the framework
 of the casing and carries at one end a beveled
 gear 7, with which meshes a similar gear 8, re-
 20 ceiving motion from any suitable source of
 power, (not necessary to be shown,) the shafts
 9, carrying the carbon-collecting wheels 10,
 being similarly driven through worm-wheels
 11, meshing with worms 12, the shafts 13 of
 25 the latter being driven from any suitable
 source of power. The driving mechanism of
 only one of the shafts 9 is shown herein, it
 being understood that the driving mechanism
 for the other shaft will be a duplicate of that
 30 shown, and as this will be readily under-
 stood detailed illustration is thought to be
 unnecessary. To present suitable supports
 for the actuating-gears, worms, and worm-
 wheel, the casing is extended on one side, as
 35 shown at 14, so that the gears will be on the
 outside of the walls of the casing proper, and
 thus shielded against any accumulation of
 carbon-black. The parts so far described are
 practically the same as those shown in the
 40 application referred to; but it is to be under-
 stood that in actual practice the parts thus
 far described may be varied as to shape and
 manner of construction and still be within
 the scope of the invention.
 45 Mounted upon cross-sills 15, secured to the
 ends of the casing, are the gas-burner service-
 pipes 16—in this instance two—and carried by
 these pipes is a series of gas-burners, (desig-
 nated generally 17,) as clearly shown in Figs.
 50 2 and 6. Each gas-burner comprises a head
 18, which is a hollow structure, preferably
 circular in cross-section, and has formed on
 its upper side a plurality of nipples 19—in
 this instance five—these nipples gradually
 55 decreasing in height from the ends of the
 head to the center, the center nipple being
 the lowest, and by this arrangement when
 the gas-tips 20 are associated with the nip-
 ples, as by a threaded connection, as shown
 60 in Fig. 6, the discharge ends of the tips will
 be disposed in the arc of a circle correspond-
 ing to the periphery of the carbon-collecting
 wheels 10, as clearly shown in Fig. 2, this ar-
 rangement of the tips causing an even de-
 65 posit upon the carbon-collecting wheels of the
 carbon from each of the gas-tips. As a mat-
 ter of specific improvement I prefer to con-
 struct the gas-tips, as shown in Fig. 6, with a
 pointed upper end, at the apex of which will
 be the gas-escape opening, the tapered end of
 the gas-tip operating to deflect any carbon-
 black deposited upon it, and thereby in a sim-

ple and ready manner to effect self-cleaning
 of the tips. The lower center portion of the
 head 18 is provided with a threaded exten- 70
 sion 21 to be engaged by a threaded sleeve 22,
 this sleeve to engage with a flanged head 23
 of a nipple 24, screw-threaded into the gas-
 service-supply pipe 16, as shown in Fig. 6,
 the upper edge of the nipple 24 being pro- 75
 vided with a knife-edge bearing-ring 25 to
 bear against the lower face of the extension
 21, and thereby to effect a gas-tight juncture
 at this point. By the manner of associating
 the gas-burner head with the nipple 24, 80
 through the medium of the sleeve 22, it will
 be seen that separation of the head from the
 nipple may be readily effected when it is nec-
 essary to remove the gas-burner for purposes
 of cleansing or repair. 85

As clearly indicated in Fig. 6, it will be seen
 that the burner-tips are individually adjust-
 able in a vertical direction within the nipples
 19 by reason of the screw-threaded connec- 90
 tion therewith and for the purpose of adjust-
 ing the tips with respect to the carbon-col-
 lecting wheels, so as to maintain the same un-
 der all circumstances at the proper distances
 from the collecting-wheels to effect the de-
 positing of the finest quality of carbon-black 95
 upon the collectors. It will also be noted
 that the tips are of equal lengths, whereby
 only one length of tip is required, and any of
 the tips may be readily replaced when burned
 out or otherwise damaged without the neces- 100
 sity for selecting a particular size of tip for
 any particular nipple.

As herein shown and as before stated, there
 are but five gas-tips shown as associated with
 each head 18; but it is to be understood that 105
 the invention is not to be limited to this num-
 ber, as they may be increased or diminished
 and still be within the scope of my invention.
 It is to be understood that there is one of these
 gas-burners for each of the carbon-collecting 110
 wheels 10, as shown in Fig. 1, and as each op-
 erates in the same manner a description of
 one will serve for all.

The carbon-collecting wheel 10, which con-
 stitutes one of the salient and most important 115
 features of the present invention, is con-
 structed with a view not only to catch and re-
 tain a large part of all the carbon-black pro-
 duced, but also to split the flame, and there-
 by to reduce to a minimum the production of 120
 what is known as "gray" or "burnt" car-
 bon-black, which is generally formed at the
 point where the flame first impinges against
 the carbon-collecting wheel, so that by re-
 ducing the production of the gray or burnt 125
 carbon-black the character of carbon-black
 produced will be of high grade, and thus more
 valuable as a commercial product.

A form of carbon-collecting wheel herein
 shown has been found thoroughly effective 130
 for the purposes designed, and comprises two
 like sections 26 and 27, each composed of a
 hub portion 28, a plurality of arms 29, inte-
 gral therewith, a flat collecting-face 30, and

a flange 31, arranged intermediate of the ends of the collecting-face to divide the latter into opposite collecting-surfaces. The hub of the section 26 is in this instance held assembled with the shaft 9 by a rivet or bolt 32; but it is to be understood that, if preferred, the hub may be associated with the shaft by a key or any other suitable form of fastening device. It is also to be understood that instead of making the collecting-wheel in two sections, as described, it may be cast in one piece, and as this arrangement will be readily understood detailed illustration is deemed unnecessary. As herein shown, the sections are secured together by rivets 33, passed through the flange portion of the wheel, and under ordinary circumstances this form of connection will be found of sufficient stability for the purposes required; but should it be found necessary additional rivets may be employed, these to be passed through the arms 29. It will be observed that the rims of the wheel-sections form two opposite flat carbon-collecting surfaces, which are separated by an intermediate flange which is designed to split or divide the flange, thereby to direct the latter equally to the opposite carbon-collecting surfaces.

Secured at each end of the casing is an angle-iron 34, upon which is supported a hopper 35, the hopper to extend from end to end of the casing, as clearly shown in Fig. 1. Secured to the angle-iron in parallel relation to each other and on each side of the hopper 35 are two supporting beams or rods 36, from each of which depend at each end two hangers 37, and from each pair of hangers passes a rod or bar 38, these bars constituting the supports for the carbon-collecting-wheel scrapers 39, as shown in Fig. 2. As each of the scrapers is a counterpart of the other, a description of one will serve for all. Each scraper comprises a shank 40, having at its upper end a hook 41 to engage with the rod 38, as shown in Fig. 2, and carries at its lower end a scraper or knife 42, which is shaped to straddle the flange 31 and bear upon the collecting-surfaces at opposite sides of the flange, the members 43 of the scraper that bear upon the collecting-face being of greater width than the said face, thereby to prevent any accumulation of carbon-black upon the edges or sides of the collecting-surfaces. Intermediate of the ends of the shank is arranged a weight 44, which is disposed downward, the weight to be either integral with the shank or secured thereto and serving to keep the scraping-knife in operative contact with the flange 31 and collecting-face 30 of the carbon-collecting wheel, thereby to insure removal of the carbon-black as fast as deposited. As shown in Fig. 5, the knife is held assembled with the shank 40 by bolts 45—in this instance two—and by this arrangement should a knife become damaged or worn out it may be readily removed from the shank to permit replacement by a new one; but it is

to be understood that I do not limit the invention to a scraper having a removable knife, as it will be obvious that the scraper may be formed integral with the shank and still be within the scope of my invention.

By the provision of the rods 38 and the hooks on the shanks of the scraper-knives the detachment of the scrapers from the rods may be readily effected when for any purpose the same is desired. It is to be understood that the shanks have merely a swinging connection with the rods 38, the knives being held in proper coöperative relation with the carbon-collecting wheels by the flanges 31, as will be readily understood.

Mounted in suitable journals 46 in the ends of the casing is a shaft 47, carrying contiguous to the inner walls of the casing two spiders 48, these spiders being suitably associated with the shaft, as by keys or the like, each spider comprising a hub 49, a plurality of arms 50, either integral with or secured to the hub, and a rim 51, either integral with or secured to the arms 50. Secured to the rims in any suitable manner is a screen covering 52 of metallic netting, the mesh of which may be of any desired size, the whole constituting a carbon-collecting cylinder 52^a, which operates to catch any free carbon that escapes retention upon the carbon-collecting wheels, the carbon accumulating upon the collecting-cylinder being removed therefrom by brushes 52^b, carried by a shaft 53, arranged beneath the cylinder, the ends of the shaft being mounted in suitable openings formed in the sides of the casing, one end of the shaft projecting beyond the casing and carrying a lever 54, upon which is mounted an adjustable weight 55, the weight operating to cause the brushes to impinge against the surface of the screen with sufficient force to effect removal of the carbon-black as deposited. As a means for operating the condensing-cylinder I provide the shaft 47 with a worm-wheel 56, and meshing with this worm-wheel is a worm 57, mounted on a shaft 58, the shaft being connected with any source of power (not shown) whereby to drive the cylinder at the desired rate of speed. Owing to the difference in size between the diameter of the collecting-cylinder and the carbon-collecting wheels, it is essential that the rate of speed of the latter will be greater than the former, and I have found in practice that by imparting to the driving mechanism of the carbon-collecting wheels a speed that will rotate these wheels six times in one hour and have the driving mechanism of the collecting-cylinder rotate the same once in twelve hours the most effective coaction between the two sets of collectors is effected, and as the mechanism for effecting the difference in rate of speed of rotation of the carbon-collecting wheels and the collecting-cylinder may be effected by gears in a well understood manner illustration is deemed unnecessary. While the ratio of speed between the two sets of collectors

above given has been found thoroughly effective in the operation of the device, it is to be understood that this is given merely as an illustration of one way in which the best results may be effected, it being understood that the invention is not to be limited to the rate of speed at which the parts are driven, as any other ratio of speed between the two mechanisms may be employed as may be found desirable or necessary.

The roof 59, covering the casing, is by preference peaked and is open in line with the collecting-cylinder 52^a, as shown at 60 in Fig. 2, the open portion being covered by a hood 61, extending the length of the roof and associated therewith by spacing-blocks 62, the space between the hood and the roof presenting an escape for hot air from the interior of the casing. Connecting with the inner edges 63 of the roof are two screens 64, these being by preference arranged to converge toward each other and operating to catch and retain any small portion of carbon-black that escapes the collecting-cylinder, the inclination of the screens being such that the carbon arrested thereby will roll or drop therefrom, so that any means for cleaning the screens will be rendered unnecessary. In addition to preventing the escape of carbon these screens subserve the further function of permitting escape of hot air from the casing, as will be understood by the arrows indicated on Fig. 2, it being understood that by reason of the fact that the meshes of the collecting-cylinder are kept practically clear of any accumulated carbon the heated air from the lower portion of the casing will be free to escape through the meshes of the collecting-cylinder and thence out through the escape-spaces 65, formed between the hood and the roof. In order to permit as rapid escape of hot air from the apparatus as possible without permitting escape of any of the carbon-black, the ends of the collecting-cylinder adjacent to the hub are left open, as shown at 66, and the walls of the casing opposite these open portions of the collecting-cylinder are provided with openings 67, through which the heated air in the collecting-cylinder will escape to the outside.

While the construction, coactive relation, and general arrangement of the parts herein shown and described will be found thoroughly effective for use, it is to be understood that these parts may be changed as to shape, proportion, and relation with each other without departing from the spirit of the invention, as it will be apparent that the proper operation of the apparatus does not depend upon the precise arrangement of its parts.

The operation is as follows: The driving mechanism of the carbon-collecting wheels and the collecting-cylinder having been started, the gas-jets are ignited, and the flames therefrom impinge upon the flanges 31 of the carbon-collecting wheels and are by these flanges split and directed against the collect-

ing-faces 30 of the wheels, whereon the bulk of carbon-black is deposited, the small portion of carbon-black deposited on the face of the flange being of a somewhat lower grade than that deposited on the collecting-faces, but by reason of the smallness of its bulk as compared with that deposited on the collecting-faces this gray or burnt carbon-black, which, as before pointed out, is collected on the faces of the flanges, will not deteriorate the product. As the procedure is carried on the carbon-black deposited upon the collecting-wheels 10 is removed by the scraping-knives 42, any portion of the carbon-black not retained by the collecting wheels being carried upward and caught by the collecting-cylinder 52^a, from which latter it is detached by the brushes 52^b and falls down through the hopper 35 to the hopper 3 in the bottom of the structure, whence it is removed by the screw conveyer 4, it being understood that the shafts of the carbon-collecting wheels are placed apart such distance as to permit an unimpeded flow of the carbon-black detached from the collecting-cylinder to the hopper 3. It is further understood, as pointed out in the application referred to, that the carbon-collecting wheels are to be spaced apart upon their supporting-shafts a suitable distance to permit the free passage of air upward between the gas-burners and the carbon-collecting wheels, and by this arrangement the temperature of the apparatus is kept at the desired low degree to effect the proper smoking of the flames, thus to cause rapid deposit of carbon-black. Any small portion of carbon-black not caught and retained by the carbon-collecting cylinder escapes upward to the roof of the apparatus, where it is caught and retained by the screen 64, from which it becomes detached and drops upon the collecting-cylinder and thence downward through the hopper 35 to the hopper 3. By the arrangement of mechanism shown and described there is practically no escape of any free carbon from the structure, and by reason of the large collecting-surface presented by the collecting-faces of the carbon-collecting wheels the bulk of the carbon-black as generated is caught and retained and is removed in the manner before described.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim is—

1. In an apparatus for making carbon-black, the combination with carbon-producing means, of a vertically-rotatable carbon-collecting wheel having opposite flat collecting-surfaces the adjacent portions of which lie in the same plane, and flame-dividing

means projecting beyond and lying between the said surfaces.

2. In an apparatus for making carbon-black, the combination with carbon-producing means, of a carbon-collecting wheel having a T-shaped collecting-face.

3. In an apparatus for making carbon-black, the combination with a carbon-collecting wheel having opposite flat collecting-surfaces and an intermediate circumferential flange located between said surfaces, of gas-burning means disposed to direct the flame against the flange.

4. In an apparatus for making carbon-black, a shaft, carbon-collecting wheels secured thereto and suitably spaced apart, each wheel being provided with opposite flat collecting-surfaces and an intermediate circumferential flange disposed at substantially right angles thereto, gas-burner pipes arranged below the said wheels and carrying tips disposed to conform to the periphery of and to impinge against the said flanges, and scraping means supported above the wheels and coacting with the collecting-surfaces.

5. In an apparatus for making carbon-black, the combination with carbon-producing means, carbon-collecting wheels, and scrapers coacting therewith, a revoluble open-work cylinder arranged above the carbon-collecting wheels, and means coacting with the cylinder to clear the same of accumulated carbon.

6. In an apparatus for making carbon-black, the combination with carbon-producing means, carbon-collecting wheels arranged above the same, scraping means coacting with the carbon-collecting wheels, an open-work cylinder above the carbon-collecting wheels, means for removing the accumulated carbon from the cylinder, and carbon-retaining means arranged above the cylinder.

7. In an apparatus for making carbon-black, the combination with suitable carbon-producing means, of an open-work carbon-collecting cylinder arranged above the same, means for removing the carbon from the cylinder, a collecting-chute arranged below the cylinder, and carbon-collecting means arranged above the cylinder.

8. In an apparatus for making carbon-black, the combination with a casing for suitable carbon-producing means, of a rotary carbon-collecting perforate cylinder arranged above the carbon-producing means, the ends of the cylinder being open, and escape-openings in the casing adjacent to the open ends of the cylinder, whereby to permit escape of heated air from the cylinder.

9. In an apparatus for making carbon-black, a casing for carbon-producing mechanism, an open-top roof, a hood so disposed over the roof as to present air-passages, and inclined screens connecting with the inner edges of the roof and with the top of the casing.

10. In an apparatus for making carbon-

black, the combination with carbon-producing means, of a carbon-collecting wheel comprising two like portions suitably assembled, each comprising a hub portion, a plurality of arms, collecting-surfaces carried by the arms, and flanges carried by the collecting-faces.

11. In an apparatus for making carbon-black, the combination with suitable carbon-producing means, of an open-work carbon-collecting cylinder arranged above the same, a weight-controlled brush for removing the carbon from the cylinder, a collecting-chute arranged below the cylinder, and carbon-collecting means arranged above the cylinder.

12. In an apparatus for making carbon-black, the combination with suitable carbon-producing means, of an open-work carbon-collecting cylinder arranged above the same, means for removing the carbon from the cylinder, and a collecting-chute arranged below the cylinder.

13. In an apparatus for making carbon-black, the combination with carbon-producing means, of a hollow rotary perforate collecting-cylinder mounted over the carbon-producing means to collect the carbon and permit of the free escape of heated air, and a scraper in frictional engagement with the rotatable collector-cylinder.

14. In an apparatus for making carbon-black, the combination with carbon-producing means, of a hollow rotary collecting-cylinder formed of metallic netting and mounted over the carbon-producing means to collect the carbon and permit of the free escape of heated air, and a scraper in frictional engagement with the rotatable collecting-cylinder.

15. In an apparatus for making carbon-black, the combination with carbon-producing means, of a pair of primary carbon-collectors located above the carbon-producing means and separated by an interspace, a rotatable secondary carbon-collector located above and aligned with the interspace between the primary collectors, a scraper in frictional engagement with the lower side of the secondary collector, and a chute located between the primary and secondary collectors and constructed to receive the carbon scraped from the secondary collector and to discharge the same downwardly through the interspace between the primary collectors.

16. In an apparatus for making carbon-black, the combination with carbon-producing means, and a rotatable carbon-collector located above said means, of a support located above the carbon-collector, and a scraper having its upper end provided with a hook which is detachably engaged with the support to pivotally mount the scraper, the latter being normally in contact with the carbon-collector.

17. In an apparatus for making carbon-black, the combination of a horizontal shaft, a series of vertically-disposed carbon-collecting wheels carried thereby and separated by interspaces, and a plurality of carbon-producing burners disposed below the respective

wheels, each burner having a plurality of tips which are individually adjustable in a vertical direction and disposed in an arc of a circle.

18. In an apparatus for making carbon-black, the combination of a horizontal shaft, 5 vertically-disposed carbon-collecting wheels carried thereby and separated by interspaces, and carbon-producing burners corresponding to and located below the respective wheels, 10 each burner having a plurality of upstanding screw-threaded nipples which increase in length outwardly from an intermediate nip-

ple, and burner-tips fitted to and individually adjustable in a vertical direction in the screw-threaded portions of the respective nipples 15 and disposed in the arc of a circle.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN HENERY MANN.

Witnesses:

K. E. ANDERSON,
CHAS. A. TAYLOR.