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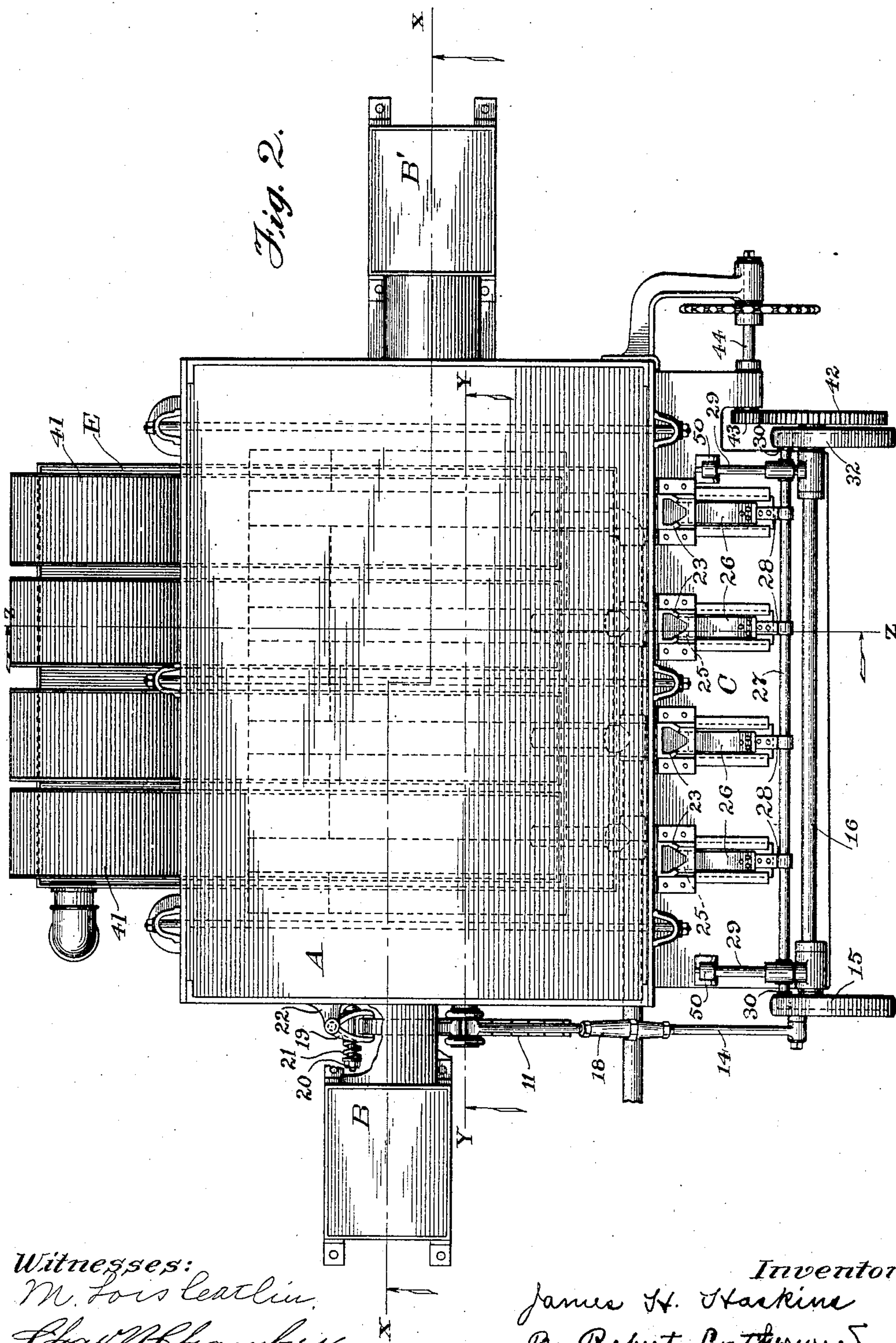
PATENTED DEC. 20, 1904.

J. H. HASKINS.  
HEATING FURNACE.

APPLICATION FILED JULY 3, 1903.

NO MODEL.

5 SHEETS—SHEET 2.



Witnesses:  
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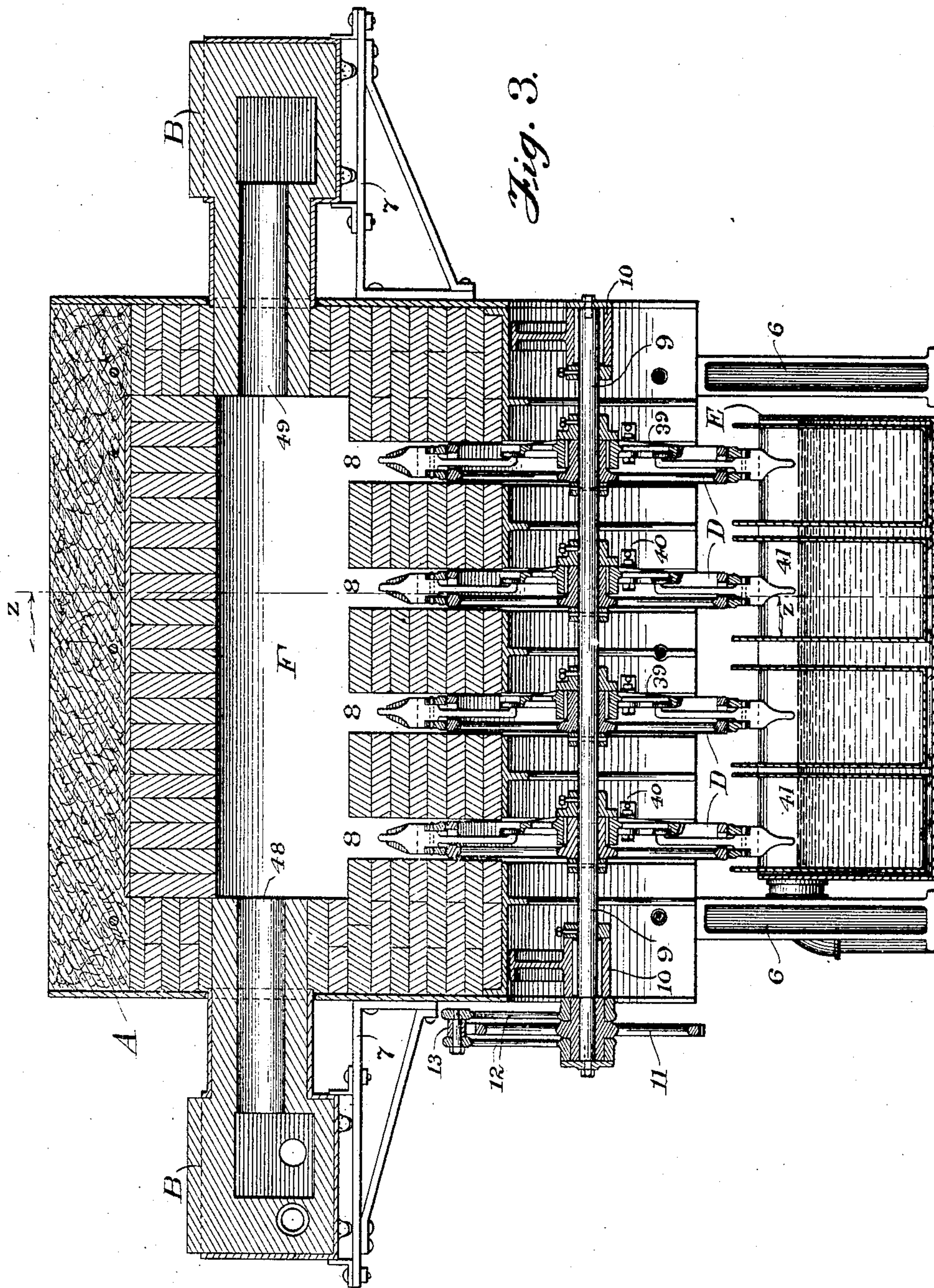
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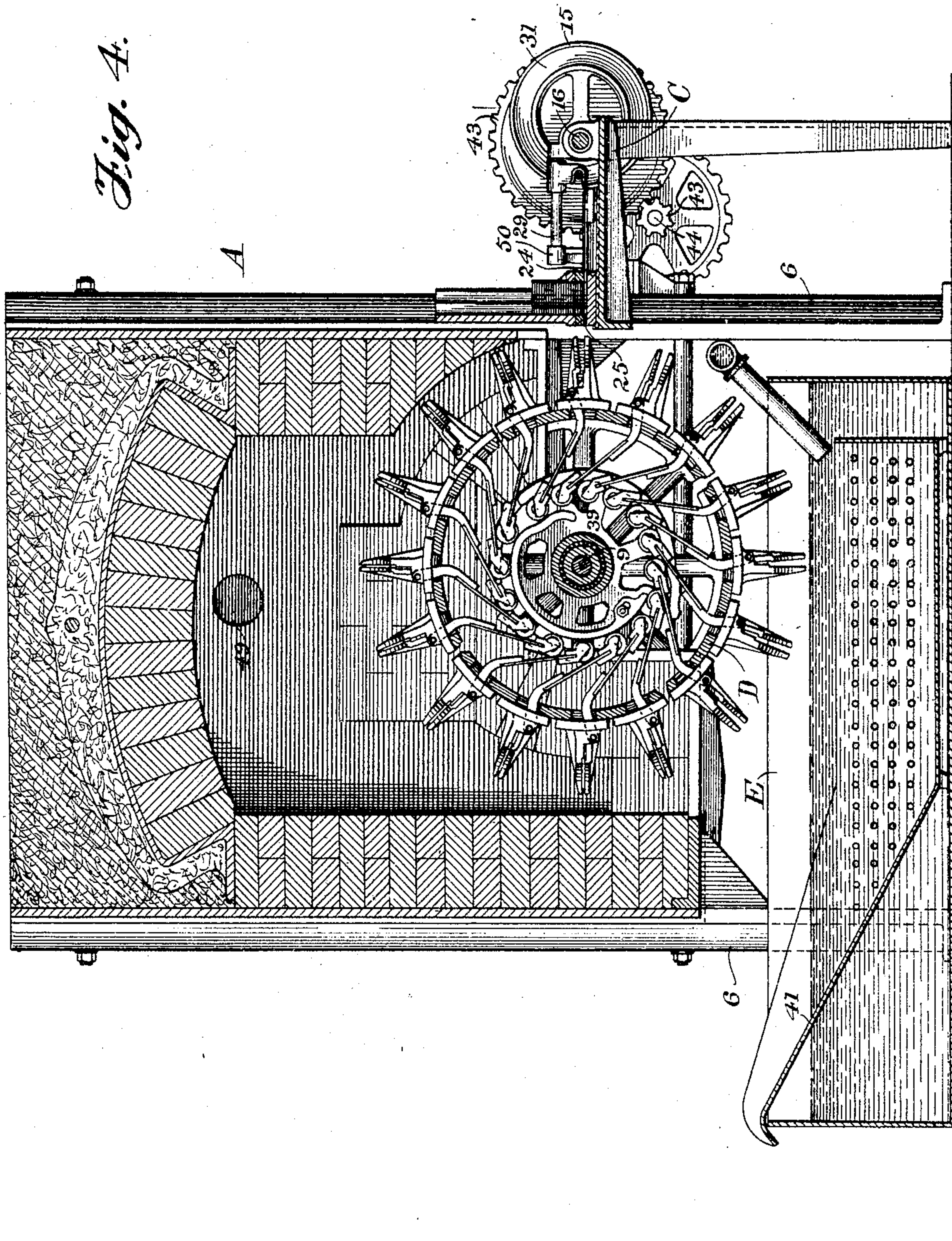
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5 SHEETS—SHEET 4.



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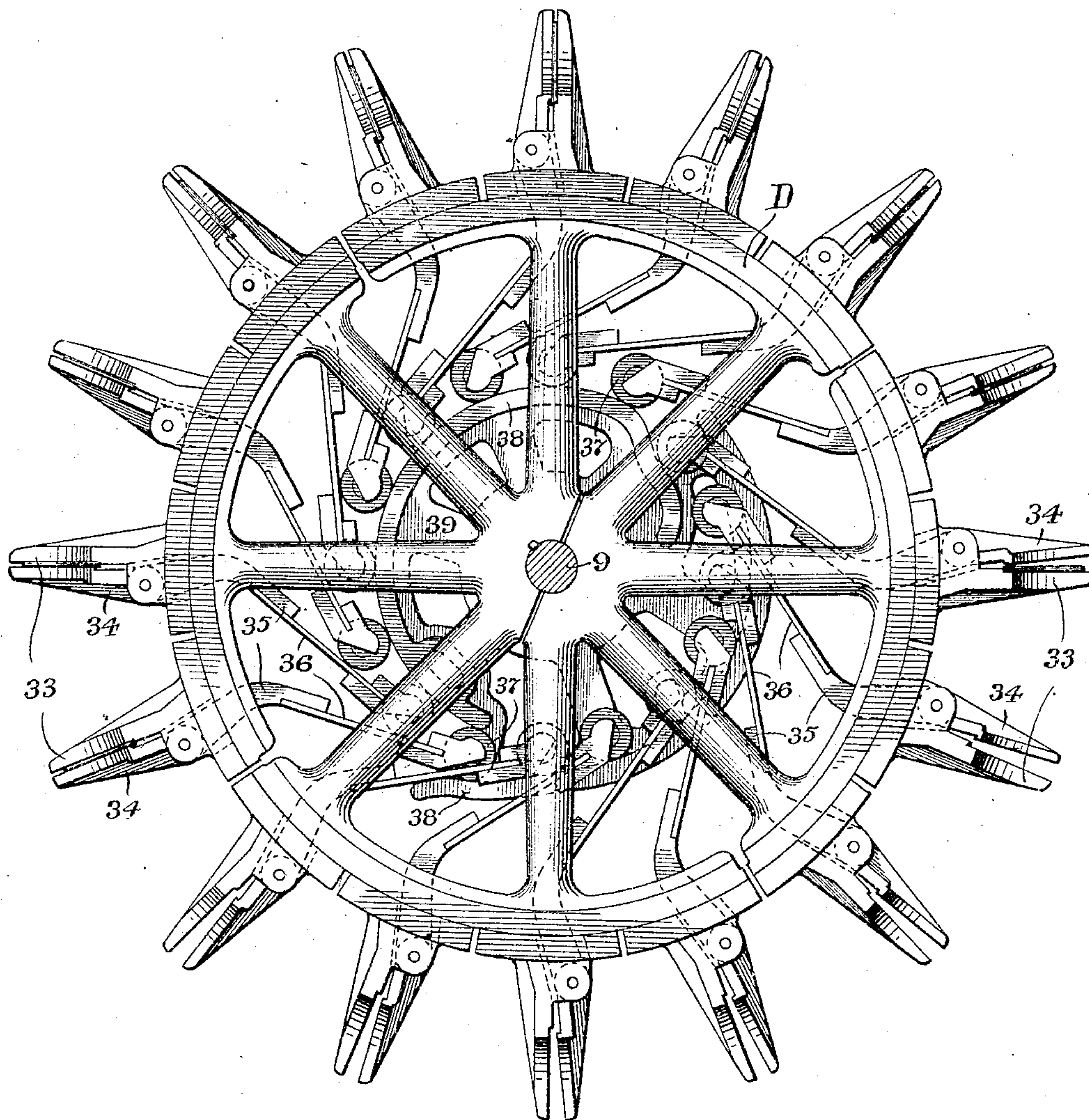
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5 SHEETS—SHEET 5.

*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

JAMES H. HASKINS, OF SAN DIEGO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO INTERNATIONAL HARVESTER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

## HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 777,728, dated December 20, 1904.

Application filed July 3, 1903. Serial No. 164,134.

*To all whom it may concern:*

Be it known that I, JAMES H. HASKINS, a citizen of the United States, residing in the city of San Diego, county of San Diego, and State of California, have invented a new and useful Improvement in Heating-Furnaces, of which the following is a specification.

My invention relates to automatic or continuous heating-furnaces.

It has for its object to provide means for rapidly and uniformly heating articles supplied to it for any purpose whatever, but as herein shown is especially adapted for heating for the purpose of tempering. It includes mechanism for conveying such articles to and through the furnace and delivering them into a suitable receptacle or cooling-tank. Its further object is to provide fuel and heating chambers which are especially adapted to apply uniformly and economically the desired heat during the transit of the articles to be heated.

The accompanying drawings illustrate a machine embodying my invention designed for heating the cutting edges of cutter-bar sections for the purpose of tempering them, in which—

Figure 1 is an end elevation of my furnace, showing portions of the mechanism for simultaneously engaging a number of cutter-bar sections, subjecting them to heat within the furnace, and thereafter depositing them in the cooling-tank to harden them. Fig. 2 is a plan view of the parts shown in Fig. 1, illustrating more especially the position of the fuel-chambers and the mechanism for feeding the sections into the grasp of the tongs. Fig. 3 is a longitudinal sectional elevation taken on planes represented by lines  $x x$  and  $y y$  in Figs. 1 and 2. Fig. 4 is a transverse sectional elevation taken on a plane represented by line  $z z$  in Fig. 2. Fig. 5 is a side elevation of a tong-wheel, showing also the tong-operating cam.

In the drawings, A denotes the furnace. As illustrated it is of approximately cubical form inclosed on the sides and open on the bottom to permit operation of the tong-wheel

and discharge of the heated sections, and it is mounted on legs or supports 6. On opposite ends are suitable fuel-chambers B B', mounted upon brackets 7, secured to the frame of the furnace. The flues 48 and 49 of the chambers B and B' open into the upper portion of the furnace A, their axes being offset, so that the blasts coming together shall strike a little off the center and be given a whirling motion as they encounter each other in the heating-chamber F. This arrangement is adapted to diffuse the heat more effectually throughout this chamber.

On the under side of the heating-chamber F is a plurality of openings or apertures 8, adapted to admit an equal number of rotating tong-wheels. These wheels are mounted in series upon the shaft 9, which extends beneath. Shaft 9 is mounted at the ends in suitable bearings 10, secured to the frame of the furnace. It is desirable to provide the bearings of the shaft 9 and the tong-operating cams hereinafter mentioned with antifriction roller or ball bearings. Secured to one end of the shaft 9 is the ratchet-wheel 11, which is provided with ratchets corresponding in number to the number of tongs with which each tong-wheel is provided. Journaled upon the shaft 9 on each side of the ratchet-wheel 11 are the rocker-arms 12, provided with the pawl 13, adapted to engage the ratchets. The ratchet-wheel 11, and consequently the shaft 9, to which it is rigidly secured, is intermittently actuated by the crank 17 on eccentric 15 through the pitman 14, attached thereto and to the rocker-arm. The eccentric 15, mounted on shaft 16, is driven in the direction of the arrow shown in Fig. 1. An adjustment of pitman 14 may be obtained by making it in two parts, threading the ends, and joining them by means of threaded sleeve 18. By means of the above-described parts power applied to shaft 16, revolving it in the direction of the arrow, will move the tong-wheels intermittently in an arc corresponding to the distance between the ratchets. To prevent the tong-wheels from moving by their inertia in a greater arc, the ratchet-wheel is pro-



vided with a brake or friction retarding device. This may be constructed, as herein shown, in the form of clamping members 19, located on either side of the ratchet-wheel and held in contact therewith by a bolt 20 and strong spring 21, which members may be pivoted in ears 22, forming a part of the furnace. It may also be found desirable to use a stop where the clamping members are not positive enough in their action. Hence I do not wish to be limited to a friction device of the kind illustrated.

In front of the furnace, upon a table or other suitable support C, is mounted a plurality of chutes 23, corresponding in number to the number of tong-wheels. These chutes are constructed to hold the cutter-bar sections in position for feeding into the grasp of the tongs. As illustrated, they are adapted to hold a series of cutter-bar sections in a column and are open upon their front sides for convenience in placing these articles. The chutes are mounted upon blocks 24, which are provided on the upper surface with a groove 25, equal in width and thickness to that of the section. The pushers 26 enter the grooves in which the lowermost sections lie and when advanced push the section from underneath each column of sections into the tong-wheels which at that time are immediately in front and in alinement with the grooves. The ends of the pushers are secured to blocks which slide in ways mounted upon the table C and are connected to the reciprocating bar or rod 27 in any suitable manner, preferably by the safety-clutches 28. The bar 27 is supported at each end by slides 29, which are movable upon suitable ways 50, also mounted upon the table C. The ends of the bar are provided with suitable antifriction-rollers 30 and project into the grooves 31 of the eccentrics 15 and 32. As the eccentrics are rotated the bar is reciprocated, thus simultaneously reciprocating the pushers. I prefer to connect the pushers and bar by safety-clutches, which in case any one of the pushers is accidentally obstructed in its advance will prevent this obstruction from interfering with the proper operation of the other pushers.

By reference to Fig. 1 it will be observed that the longer radius of the eccentric 15 and the crank 17, which actuates the ratchet-wheel 11, are on opposite sides of the driving-shaft 16. The pitman 14 is so placed relative to the eccentric that the ratchet-wheel is brought to rest and the pitman begins to withdraw therefrom before the pushers advance the cutter-bar section in the grooves and that the eccentric has completed the forward movement of the pushers and begun to retract them before the pitman begins to advance the ratchet-wheel. This insures the sections entering the grasp of the tong after the tong

has come to rest and before the wheel begins its next advance.

Having thus described the relative movements of the tong-wheels and the pushers for thrusting forward the sections and the means for actuating these parts, I next proceed to describe the preferred construction of one of the tong-wheels, the construction of one being similar to the construction of the others. Fig. 5 shows a detail view of a tong-wheel D, composed of a rim made in sections with spokes uniting the sections to a hub secured to shaft 9. To each of these rim-sections is secured a plurality of stationary jaws 33, equal to the number of ratchets on the wheel 11. Pivoted to the stationary jaws are the movable jaws 34, the heels of which are curved and provided with yielding levers 36. Upon the inner ends of the levers 36 are the antifriction-rollers 37, resting upon a cam-surface 38 on cam 39. This cam is journaled on the hub of the tong-wheel D and held against rotation by the bracket 40, secured to the frame of the furnace. The cam-surface 38 is so constructed that as the tong-wheel is actuated the rollers 37 are thrust out from or drawn to the center of the wheel in such relation that as each succeeding tong approaches alinement with the chute it is held open and remains open during its pause in alinement therewith, is immediately closed as it begins to move therefrom and remains closed, tightly gripping the section while passing through the heating-chamber, is opened after passing below that chamber, so as to discharge the section, and remains open until it returns to receiving position and has received its new charge. The yielding levers 36 of the movable jaws permit sufficient latitude of movement of the jaws to accommodate them to incidental variations in the thickness of the sections, while insuring a firm grip thereupon. The jaws are preferably of such shape and dimensions as to allow the portion of the section (or other article) which is to be tempered to project therefrom while embracing the remainder thereof and shielding it against heat intense enough to harden it. It will be observed in Fig. 3 that the edges of the section are shown as projecting from the jaws, while the body of the sections are embraced by the jaws. By these means the central portion of the sections remains soft, giving the sections the desired strength. After being sufficiently heated the sections are delivered to the submerged receptacles 41 in tank E.

Shaft 16 is connected by any suitable means to power, preferably by means of gears 42, mounted thereon and meshing with gear 43 on counter-shaft 44. The shaft 16 intermittently operates the tong-wheels alternately with the pushers. In this manner a series of sections are pushed forward into the open tongs, which are so arranged that at the time the pushers



are advancing there is an open tong in alinement and immediately in front of each. The pushers are then withdrawn from under the columns of sections, permitting a new section to drop down in front of each. Meanwhile the tong-wheels are operated to grasp and advance the sections just inserted, to release the sections which have been sufficiently heated and drop them into the perforated receptacles in the tank beneath, where they are hardened, and finally to bring a new series of tongs before the pushers for the subsequent like series of operations.

My machine is adapted to heat a variety of articles other than cutter-bar sections, and the necessary changes in shapes and relative dimensions of grasping-jaws and feeding devices and other changes incident thereto will readily suggest themselves to one skilled in the art.

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

1. In a heating and tempering apparatus, in combination with a furnace and cooling-receptacle, a rotating shaft having a series of tongs circumferentially mounted thereon in such relation to said furnace that rotation of said shaft carries said tongs alternately in and out of said furnace, means for intermittently advancing and arresting said tongs, means for feeding articles to said tongs during the interval of arrest, means for delivering the articles to the cooling-receptacle, and means for automatically operating said feeding, carrying and delivering mechanism.

2. In a heating-furnace, in combination with a heating-chamber and cooling-chamber, a rotating shaft having a plurality of tongs-carrying wheels mounted thereon in such relation to said furnace that rotation of said shaft carries the tongs on each of said wheels alternately in and out of the furnace, means for intermittently advancing and arresting said shaft, means for feeding articles to said tongs during the interval of arrest, means for delivering the articles to the cooling-receptacle, and means for automatically operating said feeding, carrying and delivering mechanism.

3. In heating-furnaces in combination with a heating-chamber and mechanism for feeding articles to be heated, a tong-wheel carrying a plurality of tongs upon its circumference, means for intermittently actuating said wheel, means for holding open the jaws of each successive tong when in alinement with the feeding mechanism, means for positively retaining it in alinement therewith, means for closing said jaws to grasp the article inserted by the feeding mechanism to carry it through the furnace, and means for opening said jaw outside the furnace to discharge the article.

4. In a heating-furnace, in combination with a heating-chamber, a series of tong-wheels having a common axis each entering openings

in said heating-chamber, a series of chutes and series of automatic feeding devices adapted to deliver simultaneously within the grasp of tongs upon the several wheels articles to be heated and mechanism for intermittently revolving the series of tong-wheels and operating the feeding mechanism alternately whereby the tongs are successively automatically charged, advanced through the heating-chamber and discharged.

5. In combination with a furnace and automatic feeding mechanism therefor, a tong-wheel, a cam-surface stationarily mounted about the axis thereof, a plurality of tongs mounted at intervals about the circumference of said wheel adapted to carry articles through said furnace, said tongs consisting of a stationary jaw, a movable jaw pivoted thereto, a yielding lever projecting from said movable jaw having a roller secured to its inner end adapted to travel on said cam-surface, said cam-surface being so formed that said tongs are held open when in alinement with said feeding mechanism, closed during transit through the furnace and thereafter opened for discharge.

6. In combination with a furnace having a suitable aperture, a revolving tong-wheel adapted to enter the same through said aperture the movable jaws of whose several tongs are operated by levers, a cam-surface stationarily mounted about the shaft of the tong-wheel over which the heels of said levers travel and means for intermittently revolving said tong-wheel at fixed intervals, whereby said tongs are alternately closed upon the articles to be heated, inserted therein so as to grasp them and advance them through the heating-chamber, and opened to discharge them.

7. In a heating and tempering apparatus, a series of feed-chutes mounted at one side of a heating-chamber, reciprocating pushers adapted to thrust articles in said chutes successively into the grasp of carrying-tongs, carrying-tongs adapted to advance said articles through the furnace and discharge them outside thereof, means for intermittently advancing said tongs and said pushers alternately, for the purpose described.

8. In a heating and tempering apparatus, a series of chutes mounted at the side of a heating-chamber adapted to hold articles in feeding position, reciprocating pushers adapted to thrust the lowermost articles in said chutes into the grasp of carrying-tongs, carrying-tongs adapted to advance said articles through the furnace and discharge them outside thereof, means for intermittently advancing and arresting said tongs and means for advancing said pushers while said tongs remain stationary, for the purpose described.

9. In combination with a heating-chamber, a tong-wheel mounted on a shaft below said chamber, tongs upon the circumference of said



wheel adapted to carry articles through said chamber, a pusher adapted to thrust articles into the grasp of said tongs, a ratchet-wheel also mounted on said shaft, an eccentric mounted on a driving-shaft and provided with an eccentric-groove, a roller adapted to operate in said eccentric-groove connected with said pusher, a pawl adapted to engage successive notches on said ratchet-wheel, a rod connecting said eccentric and said pawl, said parts being so placed and formed that a revolution of the eccentric advances the pusher while said tongs remain stationary and thereafter withdraws the same and advances the tong-wheel through an arc corresponding to the distance between adjacent tongs.

10. In a heating-furnace, a heating-chamber, fuel-chambers connected therewith by flues, a tong-wheel rotating on a shaft below said heating-chamber, the tongs of said wheel successively entering said chamber through an aperture therein, means for alternately advancing and arresting said tong-wheel, means for alternately maintaining the jaws of said tongs opened and closed, and means for automatically charging said tongs while stationary.

11. In a heating-furnace, a heating-chamber, fuel-chambers connected thereto by oppositely-disposed flues whose axes are offset, a tong-wheel rotating on a shaft below said chamber whose tongs enter said chamber through an aperture therein, means for automatically and intermittently rotating said tong-wheel and means for opening and closing the jaws of said tongs.

12. In combination with a heating-chamber, a tong-wheel entering the same, a ratchet-wheel fast on the shaft thereof, a pitman carrying a pawl which engages with said ratchet-wheel, means for reciprocating said pitman whereby successive notches of said ratchet are engaged and said wheel rotated intermittently, and a brake whereby said tongs are held stationary during the intervals, for the purpose described.

13. In combination with the tong-wheel of a heating-furnace, a ratchet-wheel made fast to the shaft thereof, a pitman and pawl adapted to intermittently rotate the same, an eccentric adapted to operate said pitman, and feed mechanism operated by said eccentric whereby the tongs are charged during their stationary intervals, for the purpose described.

14. In combination with the intermittently-rotating tong-wheel and the heating-furnace

entered thereby, a chute adapted to receive articles to be heated, a guideway adapted to conduct articles to the tongs, a pusher adapted to thrust such articles into the grasp of the tongs, mechanism for intermittently rotating said tong-wheel, arresting the tongs in alignment with said guideway, mechanism for maintaining the jaw of the tongs open while in said alignment and thereafter closing the same, and mechanism for advancing said pusher while said tong remains stationary, for the purpose described.

15. In combination with the tong-wheel of a heating-furnace, the chute and pusher adapted to guide and propel respectively the article to be heated into the jaw of the tongs, an eccentric adapted alternately to advance and withdraw said pusher, and a yielding clutch intermediate of said pusher and eccentric, for the purpose described.

16. In a heating-furnace the combination with a heating-chamber, of revolving tongs, means for successively feeding articles thereto, means for intermittently revolving said tongs to carry said articles within said chamber, and means for delivering said articles after they have been heated, all of said means being automatic in their operation.

17. In a heating-furnace, the combination with a heating-chamber, of revolving tongs, means for successively feeding articles thereto and locking them therein, means for revolving said tongs to carry said articles within the heating-chamber, means for delivering said articles after they have been heated, and means for feeding and revolving said tongs intermittently and alternately, for the purposes described.

18. In a heating-furnace, in combination with a heating-chamber and cooling-receptacle, a rotating shaft having a plurality of tongs circumferentially mounted thereon, means for successively feeding articles thereto in a positive manner, means for operating said tongs to grasp said articles, means for revolving said tongs to carry the articles within the heating-chamber, means for releasing said tongs and delivering said articles to the cooling-receptacle, and means for feeding and revolving said tongs intermittently and alternately, for the purpose described.

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