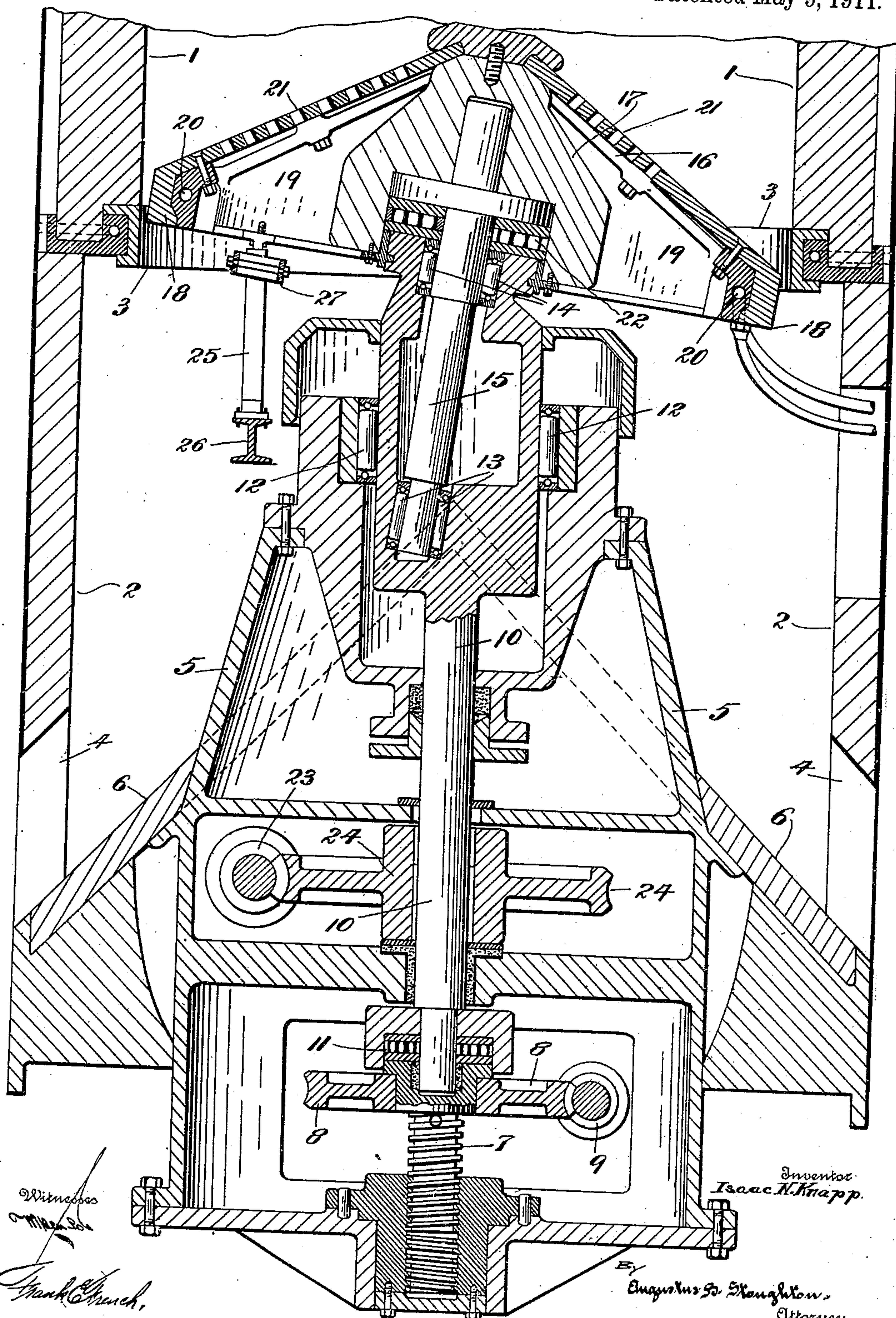


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 GRATE FOR WATER GAS AND OTHER APPARATUS.  
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991,728.

Patented May 9, 1911.



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# UNITED STATES PATENT OFFICE.

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## GRATE FOR WATER-GAS AND OTHER APPARATUS.

991,728.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed December 12, 1907. Serial No. 406,142.

*To all whom it may concern:*

Be it known that I, ISAAC N. KNAPP, a citizen of the United States, and resident of Ardmore, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Grates for Water-Gas and other Apparatus, of which the following is a specification.

Objects of the present invention are to continuously subject the particles of fuel of the fire to a gentle movement, thus not only freeing their surfaces from ash and exposing them advantageously to the steam and air which are passed through the fire, but also preventing undue collection of clinkers; to provide not only for the continuous removal from the fire to the ash-pit of ashes and clinkers, but also for the intermittent removal of an accumulation thereof; to impart to a non-rotating grate a rocking motion which will swing successive portions of its rim into elevated position thereby causing it to operate to produce and maintain a good fire not only for gas making, but also for other purposes; to provide for raising and lowering such a grate while in motion for the purpose of removing ashes and clinker from the fire, and to provide simple, reliable and efficient mechanism by which the grate is rocked and raised and lowered from beneath and in the manner mentioned.

One embodiment of the invention is shown, principally in central section, in the accompanying drawing.

In the drawing 1, is the combustion chamber of the generator and 2, is the ash-pit. These are usually circular in cross-section and between them is interposed a water cooled metallic ring 3.

4, are openings for the removal of ashes.

Within the ash pit there is arranged a suitable pedestal 5, which is provided with an inclined housing 6, upon which the ashes fall and by which they are directed through the openings 4, at such times as may be necessary and in a manner that will be presently described. At the base of the pedestal there is arranged a jack screw 7, which may be raised and lowered as by means of a worm-wheel 8 and worm 9, which can be operated from the exterior of the generator, although it is not necessary to show means

for this purpose, as they will be well understood.

Arranged vertically in the pedestal is a revoluble shaft 10. It has a step bearing upon the jack screw 7 and is shown as mounted upon an end thrust roller bearing 11. At its upper end the shaft 10 has in the pedestal a bearing 12, shown as of the roller variety and it carries two bearings 13 and 14, shown as of the roller variety. These bearings 13 and 14, are arranged to revolutely support a short shaft or spud 15, with its axis at an inclination to the axis of the shaft 10. The inclination of the two shafts is such that their axes, if prolonged, would coincide at substantially the center of the circular base of the grate 16. The latter is shown to comprise a circular spider consisting of a central portion 17 and a ring portion 18 with radial arms 19, extending between them.

20, are provisions for water cooling the grate and 21, are reticulated or perforated plates carried by the spider and the openings in them need not be large enough to permit of the passage of ashes, as they are primarily intended to serve for the passage of air and, in the present instance, steam. The spider is mounted upon the shaft 15. A thrust bearing 22 is interposed between the bottom of a collar on the spud 15, and the top of the revolving shaft 10. Between the central portion 17, and the top part of the revoluble shaft 10, is arranged a dust guard shown to comprise a flange projecting inward into an appropriate groove in the top of the part 10, so that the part 10, is free to turn, the flange sliding in the groove for this purpose.

With the parts in the position shown, the shaft 10, is revolved, for example, by means of the work 23 and worm wheel 24, which is revoluble in the pedestal and is splined or otherwise secured to the shaft in such a way that the latter must turn with it and is capable of end-wise motion. The revolution of the shaft 10, causes the lower end of the spud 15, and the central part of the top of the grate to describe circles having the axis of the shaft 10 as their centers. However, the grate is held against rotary movement and yet is free to be raised and



lowered. To accomplish this, use is made of a post 25, rising from a girder 26, spanning the ash pit and connected with its circular wall and of a collar 27, movably encircling the post and connected with one of the arms 19 of the spider. Under these conditions the grate is continuously rocked and succeeding portions of its rim are swung into elevated position.

10 The positions of the grate and ring 3 on the generator, may be such that ashes continuously or intermittently escape, but proceeding in a circle, successive portions of the fire are gradually raised and lowered so that ashes are shaken from the particles of fuel and the collection of clinker is obviated. To additionally discharge clinker or ashes, the described motions of the grate are permitted to continue, but it is lowered by means of the jack screw 7, into such position that the space between the rim of the grate and the ring 3, is sufficiently wide to permit ashes to fall through and reach the housing 6, from which they are discharged through the openings 4.

What I claim is:

1. A non-rotatable grate having a jointed support carrying it from beneath and provided with means for continuously rocking it and swinging succeeding portions of its rim into and out of elevated position, substantially as described.

2. A non-rotating grate having a jointed support carrying it from beneath and provided with means for continuously rocking it and swinging succeeding portions of its rim into and out of elevated position, in combination with devices for raising and lowering the support, substantially as described.

3. The combination of a gas generator having a combustion chamber, a non-rotatable grate in said combustion chamber, said grate having a jointed support carrying it from beneath and provided with means for continuously rocking it and swinging succeeding portions of its rim into and out of elevated position, substantially as described.

4. The combination of a gas generator having a combustion chamber, a non-rotatable grate in said combustion chamber, said grate having a jointed support carrying it from beneath and provided with means for continuously rocking it and swinging succeeding portions of its rim into and out of elevated position, and a water cooled ring operatively arranged around the rim of the grate, substantially as described.

5. The combination of a gas generator having a combustion chamber, a non-rotatable grate in said combustion chamber, said grate having a jointed support carrying it from beneath and provided with means for continuously rocking it and swinging succeeding portions of its rim into and out of

elevated position, and devices for raising and lowering the support, substantially as described.

6. The combination of a gas generator having a combustion chamber, a non-rotatable grate in said combustion chamber, said grate having a jointed support carrying it from beneath and provided with means for continuously rocking it and swinging succeeding portions of its rim into and out of elevated position, with devices for raising and lowering the support and with a water cooled ring operatively arranged around the rim of the grate, substantially as described.

7. The combination of an upright revoluble shaft, means for rotating the shaft, a spud arranged at an inclination to said shaft and revolubly mounted at its upper end, a grate supported upon said spud, and means for preventing rotation of the grate when its support is rotated, substantially as described.

8. The combination of an upright revoluble shaft, means for rotating the shaft, a spud arranged at an inclination to said shaft and revolubly mounted at its upper end, a grate supported upon said spud, means for preventing rotation of the grate when its support is rotated, and devices for raising and lowering said shaft and connected parts, substantially as described.

9. The combination of a gas generator having a combustion chamber provided with an ash discharge opening, an upright revoluble shaft arranged beneath the opening, means for rotating the shaft, a spud arranged at an inclination to said shaft and revolubly mounted at its upper end, a grate supported upon said spud, and means for preventing rotation of the grate when its support is rotated, the rim of the ash discharge opening being operatively arranged in respect to the rim of the grate, substantially as described.

10. The combination of a gas generator having a combustion chamber provided with an ash discharge opening, an upright revoluble shaft arranged beneath the opening, means for rotating the shaft, a spud arranged at an inclination to said shaft and revolubly mounted at its upper end, a grate supported upon said spud, means for preventing rotation of the grate when its support is rotated, and devices for raising and lowering said shaft and connected parts, the rim of the ash discharge opening being operatively arranged in respect to the rim of the grate, substantially as described.

11. The combination of the generator having combustion and ash chambers, the latter provided in its wall with ash discharge openings, a pedestal arranged in the ash chamber and having a housing for delivering ashes through said openings, a lifting jack arranged in said pedestal, an upright



shaft carried by the jack and revolubly  
mounted in the pedestal, means in the ped-  
estal for rotating said shaft and permit-  
ting it to be raised and lowered by the  
5 jack, a spud rotatably carried by said  
shaft and inclined in respect to the axis  
thereof, a grate rotatably connected with  
the spud, and means for preventing rotation  
of the grate when its support is rotated,

said grate disposed in the gas generator be- 10  
tween the ash-pit and combustion chamber,  
substantially as described.

In testimony whereof I have hereunto  
signed my name.

ISAAC N. KNAPP.

Witnesses:

F. H. MACMORRIS,

F. B. RANKIN.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

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