O. GERLACH AND C. B. LIHME.

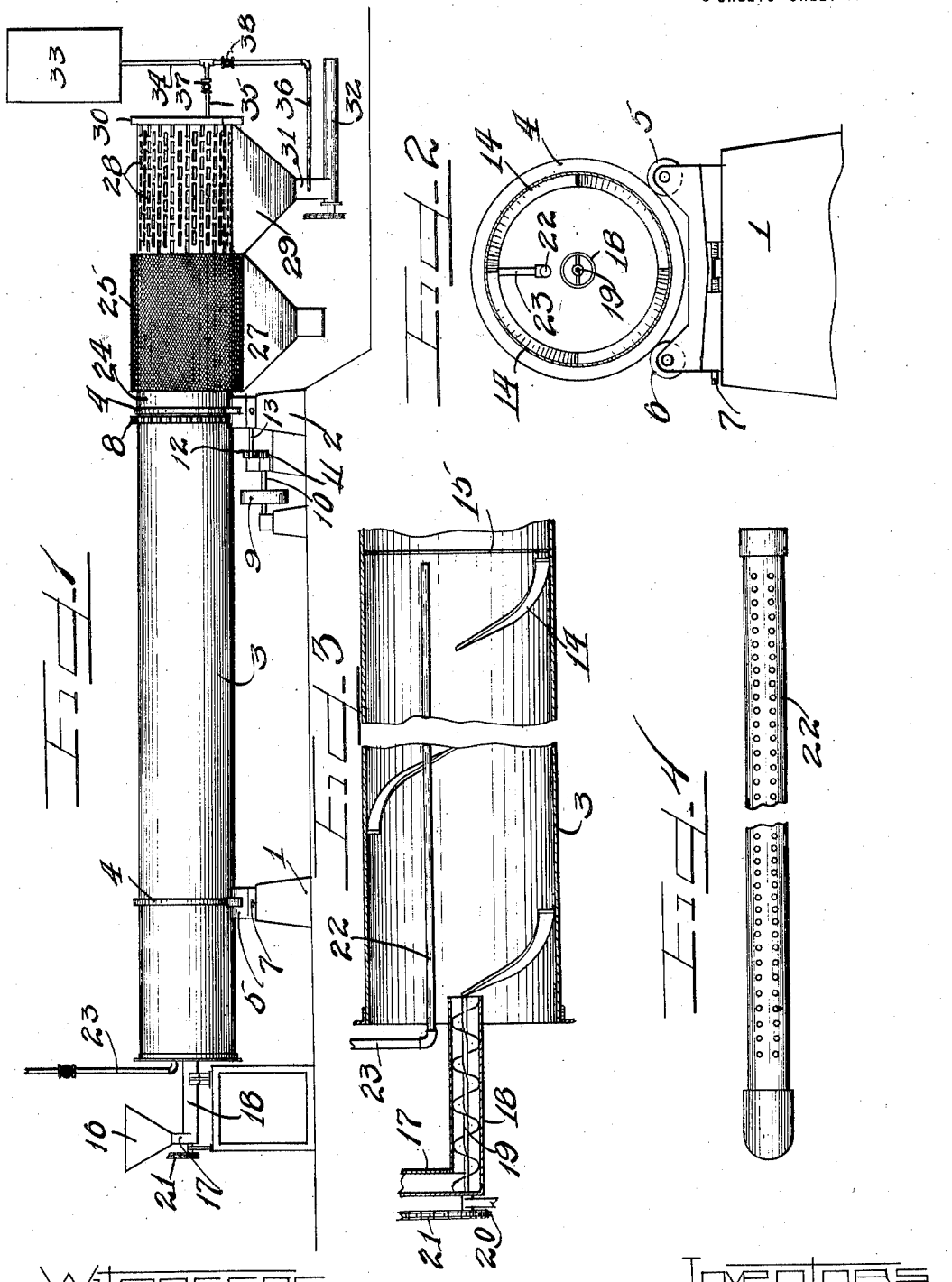
PROCESS AND MACHINE FOR RECLAIMING RETORT WASTE.

APPLICATION FILED DEC. 17, 1917.

1,312,173.

Patented Aug. 5, 1919.

3 SHEETS—SHEET 1.



Witnesses

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3 SHEETS—SHEET 2.

FIG. 5

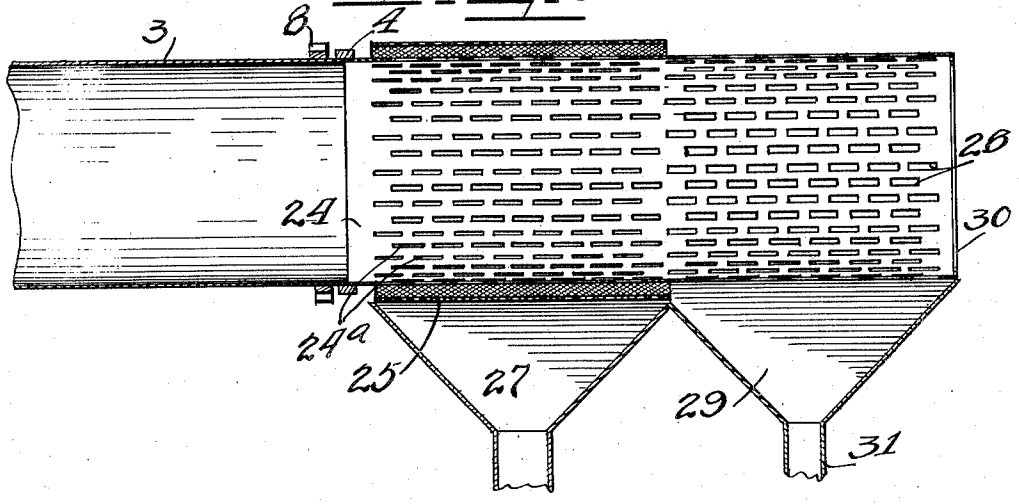


FIG. 6

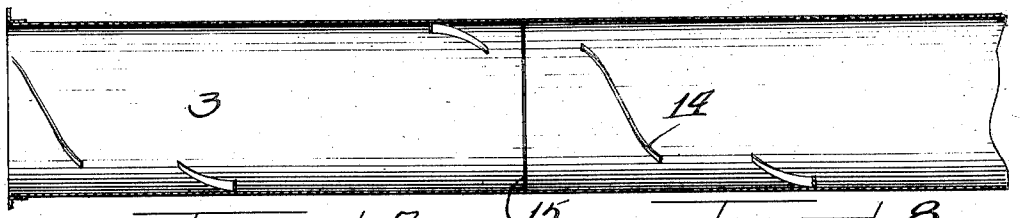


FIG. 7

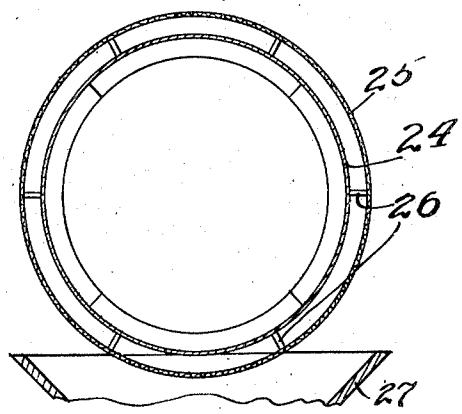
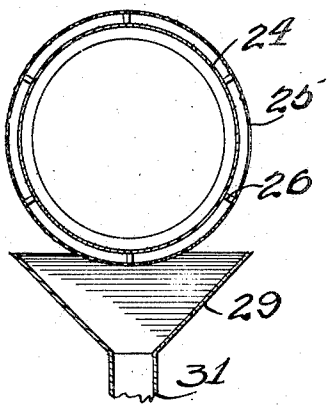


FIG. 8



Witnesses

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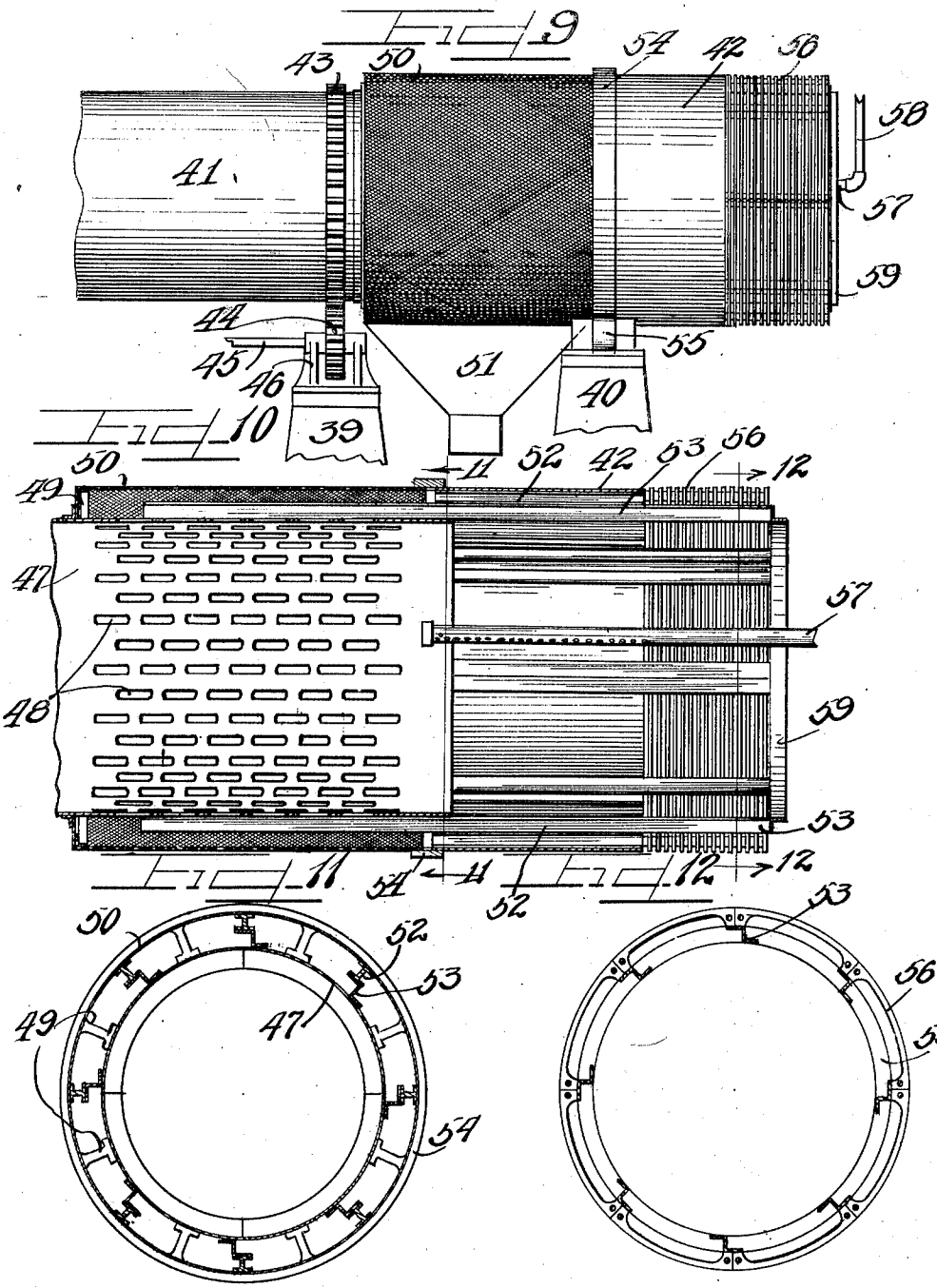
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3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

OSCAR GERLACH, OF DANVILLE, AND CHRISTIAN B. LIHME, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE INDUSTRIAL RESEARCH LABORATORIES, A CORPORATION OF ILLINOIS.

PROCESS AND MACHINE FOR RECLAIMING RETORT-WASTE.

1,312,173. Specification of Letters Patent. Patented Aug. 5, 1919.

Application filed December 17, 1917. Serial No. 207,557.

To all whom it may concern:

Be it known that we, OSCAR GERLACH, a subject of the Emperor of Germany, and CHRISTIAN B. LIHME, a citizen of the United States, and residents of the city of Danville, in the county of Vermilion and State of Illinois, and the city of Chicago, in the county of Cook, in said State, respectively, have invented certain new and useful Improvements in Processes and Machines for Reclaiming Retort-Waste; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

Retort waste contains metallic oxid, unconsumed carbon, and slag, in particles of varying size, some of which is fine dust. This waste, as it comes from the retorts, is at a high temperature and owing to the extreme difficulty in handling the material, attempts heretofore to reclaim this material have not proven successful.

It is an object therefore of this invention to provide a process for reclaiming the unconsumed carbon contained in retort waste such as that obtained in the smelting of zinc ores and concentrates.

It is further an object of our invention to provide a machine by means of which this process can be successfully performed.

It is further an object of our invention to provide a machine in which tar coated coke is made out of the carbon in retort waste.

It is an important object of our invention to provide a machine in which hot retort waste is received in its hot condition and in which the material is treated and reduced in temperature and the slag separated from the carbon, and the constituent materials discharged into hoppers for further use or treatment.

Other and further important objects of this invention will be apparent from the disclosures in the specification and drawings.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

In the drawings:

Figure 1 is a side elevation of a machine embodying my invention.

Fig. 2 is a transverse section taken through the cylinder.

Fig. 3 is an enlarged fragmentary sectional view of the receiving end of the cylinder.

Fig. 4 is a view of the spray pipe.

Fig. 5 is an enlarged longitudinal section taken through the discharge end of the machine.

Fig. 6 is an enlarged fragmentary longitudinal section of the rotary.

Fig. 7 is a transverse section taken through the slag discharge screens.

Fig. 8 is a section taken through the coke discharge end of the rotary.

Fig. 9 is a side elevational view of the discharge end of a modified form of the device.

Fig. 10 is an enlarged longitudinal section thereof with parts omitted.

Fig. 11 is a section taken on line 11—11 of Fig. 10.

Fig. 12 is a section taken on line 12—12 of Fig. 10.

As shown on the drawings:

The reference numerals 1 and 2, indicate concrete standards or abutments on which the machine is supported. The rotary consists of a long cylinder 3, provided with bearing rings 4, running on adjustable trunnions 5 and 6, which may be adjusted by the screw shaft 7, to obtain the desired inclination of the rotary.

For the purpose of rotating the rotary or cylinder, an annular gear 8, is secured to the cylinder, which is driven by means of a pulley 9, on a shaft 10, and a gear 11, is secured on the end of shaft 10, which meshes with a gear 12, on a shaft 13, which in turn has a gear secured thereto meshing with the annular gear 8. The rotary or cylinder 3, is provided on its inner side with ribs or plates 14, forming an interrupted spiral which is adapted to feed the material through the rotary at the desired rate. Retarding ribs 15, are provided in said cylinder. A hopper 16, is provided into which the hot material from the retort is dumped, and from the bottom of the hopper, pipes 17 and 18, are provided, the pipe 18, extend-

ing into the rotary. A feed screw 19, is provided in said pipe 18, which is actuated by a sprocket wheel 20, and sprocket chain 21, driven from any suitable source. A water spray pipe 22, extends into the mouth of the rotary for a suitable distance and is connected to a supply pipe 23.

The discharge end of the rotary is provided with a screen section 24, having a plurality of fine perforations 24ª, around which is secured a screen 25, of suitable mesh. Said screen 25, is rigidly connected to the perforated rotary section 24, by means of ribs 26, and a hopper 27, is positioned beneath the rotary to receive the material falling through the screen 25. Beyond the screen, the end of the rotary is provided with a screen section having larger perforations 28, below which is a hopper 29, for receiving the coke therein. An annular flange 30, is secured to the discharge end of the rotary to prevent end discharge, thus compelling the material to be discharged through the perforations 28.

A discharge chute 31, leads from hopper 29, from which a pipe 32, extends, and a suitable screw such as 19, before described, is provided in said discharge pipe 32, for feeding the material outwardly through the discharge pipe. A tar tank or receptacle 33, is provided, from which leads a pipe 34, connected with which are branch pipes 35 and 36, of which pipe 35, extends into the rotary and has a spray nozzle or pipe such as nozzle 22, for spraying hot liquid tar therethrough, and pipe 36, extends into chute 31, and likewise has a spray nozzle for discharging hot tar onto the material. Suitable valves 37 and 38, are provided for controlling the flow of hot tar through said pipes.

In the modified form of the device shown in Figs. 9 to 12, inclusive, the reference numerals 39 and 40, indicate standards or abutments for supporting a rotary 41, and a coke discharge end section 42. Secured upon the rotary 41, is a gear 43, which acts upon and meshes with a driving gear 44, keyed upon a driving shaft 45, journaled in a bearing support 46, mounted upon the abutments 39. The rotary 41, beyond the gear 43, is provided with a slag section 47, having a plurality of perforations 48, therein. Rigidly secured around the perforated section 47, and supported in position by means of ribs 49, is a screen 50, below which a hopper 51, is positioned for receiving the discharged slag.

The coke discharge section 42, is rigidly secured in position beyond the outer end of the screen 50, by means of I-beams 52, which are rigidly secured upon Z-bars 53, the inner ends of which are secured to the perforated section 47, while the outer ends of said Z-bars project outwardly beyond the outer end of the coke discharge section 42. A bearing ring 54, is secured around the abutting ends of the screen 50, and the section 42, and rests upon trunnions 55, mounted upon the abutment 40, thereby affording a means for supporting the projecting end of the rotary mechanism.

Rigidly secured upon the projecting ends of the Z-bar 53, are a plurality of equidistantly spaced parallel rings forming a ring screen 56, through which the coke is permitted to be discharged after said coke has first been coated with hot tar from a spray nozzle 57, which projects through the ring screen 56, and into the coke discharge section 42. Said spray nozzle 57, is connected by means of a feed pipe 58, which is connected with a tar tank or receptacle (not shown). The outer end of the ring screen 56, has an annular flange member 59, secured thereto to prevent end discharge of the tar coated coke, which is thus compelled to discharge through the ring screen 56.

The operation is as follows:

When the retort waste to be treated is delivered into the rotary at a high temperature, it consists of particles of various sizes, and a considerable quantity of dust. Water is sprayed onto the material in the first section of the rotary. This is for the purpose of assisting in breaking up the slag, allaying the dust, and also for cooling the material through evaporation of the water. The quantity of water and the rate of feed of the material through the rotary is such as to obtain the desired temperature and at the end of this part of the treatment, the material is still warm, and practically dry. The metal oxid on the material is removed in the passage through the rotary.

When the material thus treated reaches the section 24, having the smaller perforations 24ª, therein, the finer material is delivered therethrough into the screen. Owing to the fact that the slag is much more readily pulverized in its progress through the rotary than the coke, which tends to keep its form, the slag and gangue falls through screen 25, into the hopper 27, thus removing practically all of the slag substances, and the finest particles of coke and metal oxids which may be further treated if desired. The finer particles of coke in the screen, are delivered into the hopper 29, and the larger particles of coke are discharged through the perforations 28, into said hopper.

Prior to the coke being discharged through the perforations 28, hot tar is introduced into the discharge end of the rotary by means of a spray pipe. As the coke is still quite warm, this tar is readily taken up, giving tar coated coke which is discharged through the apertured shell of the rotary.

For the purpose of coating the particles with tar that come from the screen 25, the second tar spray pipe 36, is introduced into

the chute 31, whereby all the coke is tar coated. As the end of the rotary is provided with an annular flange, the tar coated coke must, of necessity, drop into the hopper 29.

In the modified form of the device shown in Figs. 9 to 12, inclusive, the operation is substantially the same as that already described.

It will, of course, be understood that when cold retort waste is to be treated, the water spray is dispensed with.

Many different forms of machines may be constructed to accomplish the objects of our invention, and the process may be varied and numerous other changes made without departing from the principles of our invention. We therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

We claim as our invention:

1. The process of making tar coated coke comprising spraying sufficient water into retort waste to cool the material, screening the slag from material, and coating the coke with tar.

2. The process for the purpose specified comprising passing retort waste through a rotary, mixing water with the retort waste to lower its temperature, and simultaneously partially disintegrate the slag therein, pulverizing the partially disintegrated slag, and separating the slag from the coke.

3. The process for the purpose specified comprising passing retort waste through a rotary, mixing water with the retort waste to lower its temperature, pulverizing the slag, separating the slag from the coke, and investing the coke with tar.

4. The process of reclaiming retort waste comprising cooling the retort waste and simultaneously partially disintegrating the slag therein, by evaporating water thereon, pulverizing the partially disintegrated slag, and screening the slag from the coke.

5. The process of reclaiming retort waste comprising cooling the retort waste by evaporating water thereon, pulverizing the slag, screening the slag from the coke, and saturating the coke with tar.

6. In a device of the class described, a rotary, means for delivering hot retort waste into the rotary, means for delivering water to mix with the retort waste, means for rotating the rotary for passing the material therethrough, means for screening the slag from the coke, and means for delivering hot tar to mix with the coke.

7. In a device of the class described, means for cooling retort waste, means separating the slag and gangue from the coke, and means for coating the coke with hot tar.

8. In a machine of the class described, means for holding retort waste, means for cooling the same, and simultaneously partially disintegrating the slag therein, means for passing the retort waste through said means and pulverizing the partially disintegrated slag, and a screen for sifting the slag and gangue from the coke.

9. In a machine of the class described, means for holding retort waste, means for cooling the same, means for passing the retort waste through said means and pulverizing the slag, a screen for sifting the slag and gangue from the coke, and means for spraying hot tar onto the coke.

10. In a device of the class described, a rotary, means for delivering retort waste into the rotary, a spray pipe extending into the rotary for delivering water thereinto, members secured to the rotary for disintegrating and advancing the material therethrough, a perforated section forming part of said rotary through which the finer material falls, a screen around said perforated section adapted to screen the slag, gangue and coke dust from the coke, a hopper into which the coarser coke is delivered from the end of the screen, and a screen section forming part of said rotary through which the larger particles of coke pass.

11. In a device of the class described, a rotary, means for delivering retort waste into the rotary, a spray pipe extending into the rotary for delivering water thereinto, members secured to the rotary for disintegrating and advancing the material therethrough, a perforated section forming part of said rotary through which the finer material falls, a screen around said perforated section adapted to screen the slag from the coke, a hopper into which the coke is delivered from the end of the screen, a screen section forming part of said rotary through which the larger particles of coke pass, and means for delivering hot tar to mix with the coke.

12. The process of providing a combustible product from retort waste which consists in cooling the waste and separating the slag and coke, the latter being maintained at a temperature to facilitate saturation with tar, and supplying hot tar to the coke while at this temperature.

In testimony whereof we have hereunto subscribed our names in the presence of two subscribing witnesses.

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CHRISTIAN B. LIHME.

Witnesses:
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CHARLES W. HILLS, Jr.