C. W. MILES.

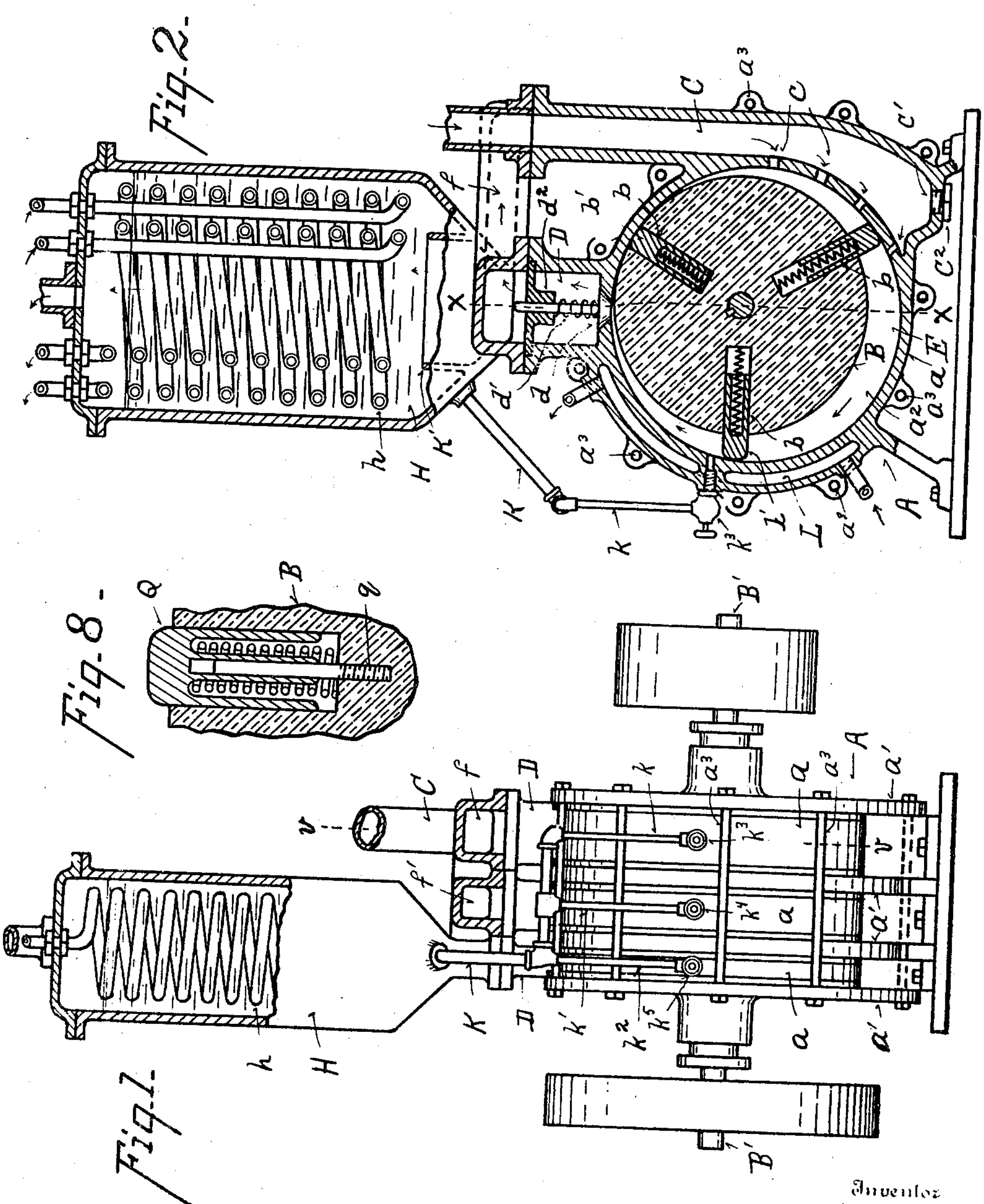
AIR AND GAS COMPRESSOR.

APPLICATION FILED DEC. 20, 1909.

1,029,309.

Patented June 11, 1912.

2 SHEETS—SHEET 1.



Witnesses

Inventor

Casper W. Miles

C. W. MILES.

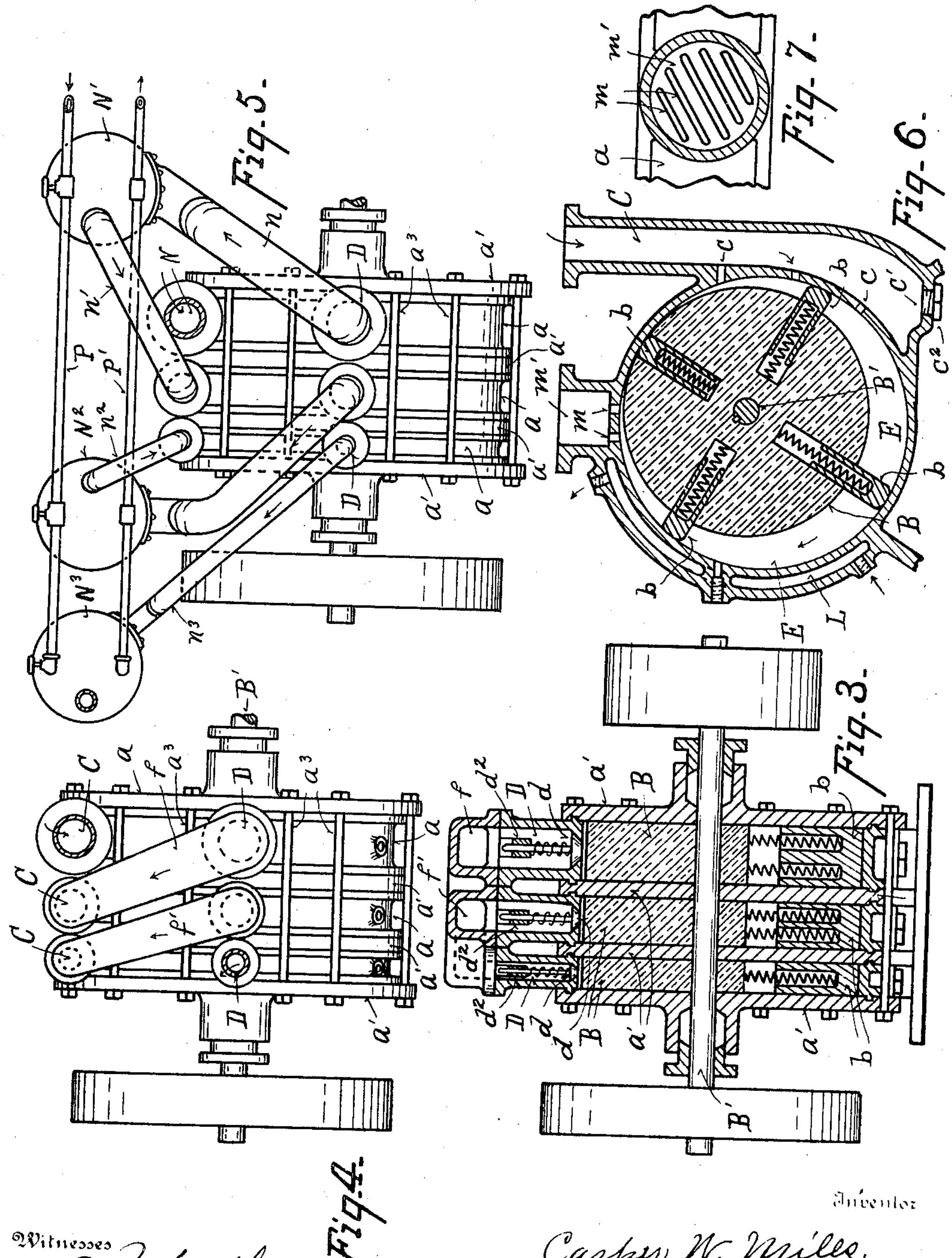
AIR AND GAS COMPRESSOR.

APPLICATION FILED DEC. 20, 1909.

1,029,309.

Patented June 11, 1912.

2 SHEETS—SHEET 2.



Witnesses

B. R. Kroff

E. M. McCallister.

Inventor

Casper W. Miles.

UNITED STATES PATENT OFFICE.

CASPER W. MILES, OF ANDERSON TOWNSHIP, HAMILTON COUNTY, OHIO, ASSIGNOR TO STEPHEN S. MILES, OF GREENSBORO, NORTH CAROLINA.

AIR AND GAS COMPRESSOR.

1,029,309. Specification of Letters Patent. Patented June 11, 1912.

Application filed December 20, 1909. Serial No. 534,146.

To all whom it may concern:

Be it known that I, CASPER W. MILES, a citizen of the United States, residing in Anderson township, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Air and Gas Compressors, of which the following is a specification.

My invention relates to improvements in air and gas compressors.

One of its objects is to provide a simple and efficient compressor of rotary type for use as an air or gas compressor.

Another object is to provide a compressor in which the valves are of minor importance or may be dispensed with entirely if desired.

Another object is to provide improved means for removing the heat from the compressed gas.

Another object is to provide improved means for lubricating the compressor parts, and providing a liquid seal to prevent leakage in the compressor.

It further consists in certain details of form, combination and arrangement, all of which will be more fully set forth in the description of the accompanying drawings in which:

Figure 1 is a side elevation of my improved compressor. Fig. 2 is a vertical section through the same on line v v of Fig. 1. Fig. 3 is a section through the same on line x x of Fig. 2. Fig. 4 is a top plan view. Fig. 5 is a view similar to Fig. 4 illustrating a modification. Fig. 6 is a view similar to Fig. 2 of a modification with valves omitted. Fig. 7 is a detail of the gas exit of Fig. 6. Fig. 8 is a detail sectional view illustrating a modification of the form shown in Fig. 2.

In the accompanying drawings A represents the compressor, the frame or shell of which comprises a plurality of rings a clamped between disks or plates a' thereby forming a series of cylindrical compressor chambers a^2 clamped together by bolts a^3. Within the respective compressor chambers are eccentrically mounted cylinders or disks B each having a series of radial slots b in which are mounted spring actuated slides or plungers b' the outer ends of which press against and maintain sliding contact with the inner face of the rings a. The disks B and slides b' fit closely between the plates a' and are mounted upon a shaft B' to which the disks B are keyed or otherwise rigidly secured so as to revolve with said shaft, which is journaled in bearings in the plates a'. The outer plates a' are provided with stuffing boxes to prevent the passage of gas at the journals.

Each of the rings a is provided with a gas intake passage C from which the gas enters the central chamber of the ring by means of small passages c, while any heavy particles settle to the bottom of the passage C and may be removed through the openings c' which are ordinarily closed by a plug or cap c^2. Each of the rings a is provided with an exit passage D which as shown in Figs. 2 and 3 are controlled by exit valves d held to their seats by springs d' and guided by supports d^2 through which the valve stems pass.

By reason of the disks B being concentrically mounted upon the shaft B' which is eccentrically located within the central chambers of the rings a, so as to touch said ring at one point, there is a crescent shaped space E between the periphery of disk B and the inner wall of the chambers, which space is divided into sections by the slides b' thereby when the shaft is revolving continually taking the gas into said space from the inlet passage on one side and compressing and forcing the gas through the exit passage at the opposite side. The passages C are so arranged as to supply gas to the space E between the respective pairs of slides until the widest portion of the space E is reached, so as to avoid expanding the gas in the compressor.

The respective rings a and disks B are progressively narrower, and the partly compressed gas discharged from the first or widest ring a is conducted by a passage f to the inlet passage C of the next ring of the series, from the discharge of which the still further compressed gas is conducted by passage f' to the supply passage C of the next or last ring a, in which the final stage of the compression takes place and the gas passes therefrom to a storage tank or preferably as illustrated to a tank H in which the heat is removed by means of cooling water circulated through coils of pipe h.

In order to lubricate the operative parts of the compressor and to reduce to a minimum any tendency of the gas to leak backward toward the intake I provide a supply of oil or other liquid, preferably a lubricant occupying a portion of the tank H through which the compressed gas rises or passes to reach the upper portion of tank H. Said lubricant is cooled by the water circulating in the pipes h, and in said tank serves as an efficient liquid conveyer of heat from the compressed gas to the cooling water. A pipe K conducts a portion of said lubricant to the branch pipes k k' k^2 from which regulated quantities are admitted by valves k^3 k^4 k^5 to the chambers E of the respective rings a at a point where the compression of the gas commences therein thus serving to seal the compressor joints and prevent the escape of the gas during compression.

An annular rib or flange K′ in the lower portion of the tank H serves to collect a cooled portion of the lubricant between said flange K′ and the wall of the tank H to serve as a supply for the pipe K.

L represents water jackets formed in the walls of the rings a at the point where compression of the gas occurs, and through which cooling water is conducted to prevent excessive heating of the compressor.

While I preferably employ one or more of the exit valves or equivalent valves to prevent a return flow of the compressed gas, yet due to the supply of lubricant during expansion, and the accumulation of said lubricant in the vertical sections of the exit passages, said lubricant will serve to prevent a return flow of gas while the shaft is revolving, and hence part or all of the exit valves may be dispensed with if desired, as indicated in Figs. 6 and 7, where the section of ring a beneath the exit passage is provided with a series of small perforations or slits m for the passage of the compressed gas and lubricant from chamber E to the exit passage m'.

In the modification Fig. 5 I have illustrated a tank corresponding to tank H for each section of the compressor, thus the gas is admitted to the first section through the inlet N and discharged from its outlet n into the lower portion of a cooling tank N′ preferably containing a body of lubricant. From the top of tank N′ the gas enters the inlet n' of the second section of the compressor, and from its outlet n^2 passes to the lower portion of cooling tank N^2, and from the top of tank N^2 to the inlet of the third section of the compressor, and from its exit n^3 to the lower portion of cooling tank N^3. Thus the gas is successively cooled after each stage of compression. P P′ represent the supply and exit pipes for the cooling water. The tanks H, N′, N^2, N^3 may be mounted above the compressor, on the floor alongside the compressor or in other convenient positions.

In Fig. 8 I have shown a portion of one of the disks B and a slide Q supported relative thereto, and against side play by means of a stud q threaded to the disk B.

In Fig. 2 I have shown three slides to each disk B, and in Fig. 6 four slides. The number of slides should be sufficient to supply a maximum charge of gas, between each pair of slides and to prevent expanding the gas in the compressor before compression takes place.

The mechanism herein illustrated and described is capable of considerable modification without departing from the principle of my invention.

Having described my invention what I claim is:

1. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of compressor cylinders embodying cylindrical members each embraced between two end plates or disks, a shaft journaled in said end plates eccentrically with reference to said cylinders, a plurality of rotary disks eccentrically located in said cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of the respective cylinders, a plurality of radially movable plungers for each of said disks, said plungers being movably seated in recesses in said disks and laterally supported by said end plates, and in contact at their outer ends with the inner walls of the respective cylinders and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, means for introducing a liquid seal between the plungers and inner walls during the earlier period only of compressing action of the plungers, gas supply and exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, and conduits connecting said ports to the respective cylinders in series.

2. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of compressor cylinders embodying cylindrical members each embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said respective

cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders, and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, means for introducing a liquid seal between the plungers and inner walls during the earlier period only of compressing action of the plungers, gas supply and exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, and conduits connecting said ports of the respective cylinders in series.

3. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of compressor cylinders embodying cylindrical members each embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said respective cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders, and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, means for introducing a liquid seal between the plungers and inner walls during the earlier period only of compressing action of the plungers, a plurality of gas supply ports through the cylinder walls of the respective cylinders adapted to continuously supply gas on the intake side of said cylinders to a point where the space between said plungers reaches a maximum, exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, and conduits connecting said ports of the respective cylinders in series.

4. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of compressor cylinders embodying cylindrical members, each embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said respective cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, means for introducing a liquid seal between the plungers and the inner walls during the earlier period only of compression action of the plungers, gas supply and exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, and valve controlled conduits connecting said respective ports of said cylinders in series.

5. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of compressor cylinders embodying cylindrical members each embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said respective cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, a plurality of gas supply ports through the cylinder walls of the respective cylinders adapted to continuously supply gas on the intake side of said cylinders to a point where the space between said plungers reaches a maximum, valve controlled exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, conduits connecting said ports of the respective cylinders in series, and valve controlled ports leading to said cylinders intermediate of said gas supply and exit ports positioned to supply a liquid lubricant and sealing medium to said cylinders during the earlier period only of the compressing action.

6. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of compressor cylinders embodying cylindrical members

each embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said respective cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, means for introducing a liquid seal between the plungers and inner walls during the earlier period only of compressing action of the plungers, gas supply and exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, conduits connecting said supply and exit ports of the respective cylinders in series, and an automatically controlled valve in each of said conduits.

7. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a compressor cylinder embodying a cylindrical member embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinder, a rotary disk located within said cylinder and concentrically supported upon and driven by said shaft, said rotary disk fitting closely between the end plates of said cylinder, a plurality of radially movable plungers, exceeding two in number, seated in recesses in said rotary disk and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner wall of said cylinder and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, gas supply and exit ports to said cylinder, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, a chamber connected with the exit port to receive the gas and a liquid sealing and lubricating medium and to separate said liquid medium from the gas and retain the liquid in the chamber, means for cooling said liquid in said chamber, and mechanism to feed a regulated supply of said cooled liquid medium to said cylinder during the earlier period only of compressing action.

8. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of adjoining compressor cylinders each embodying a cylindrical member embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders, and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, gas supply and exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, conduits connecting said ports in series, a chamber connected to the exit port of the last of said cylinders to receive and store a liquid lubricating and sealing medium, through which medium the compressed gas passes, means to cool the liquid medium in said chamber, and mechanism to supply a regulated quantity of said cooled liquid medium to the first of said series of compressors during the earlier period only of compressing action therein and from which it successively passes through the remaining cylinders.

9. In a gas compressor, means for providing a multi-stage compression with each stage of limited pressure capacity, said means comprising a plurality of adjoining compressor cylinders each embodying a cylindrical member embraced between two end plates or disks, a shaft journaled in said respective end plates eccentrically with reference to said cylinders, a plurality of rotary disks located within said respective cylinders and concentrically supported upon and driven by said shaft, said rotary disks fitting closely between the end plates of said respective cylinders, a plurality of radially movable plungers, exceeding two in number to each disk, seated in recesses in said rotary disks and closely fitting between said cylinder end plates, the outer ends of said plungers continuously contacting with the inner walls of said cylinders, and adapted to form therewith a compression chamber of gradually decreasing cross sectional area, gas supply and exit ports to the respective cylinders, each exit port being positioned in close proximity to the point of least cross sectional area of said chamber, conduits connecting said ports of the respective cylinders in series, a series of chambers into which the exit conduits of the respective cylinders discharge, said chambers serving as passages for the gas and as stor-

age reservoirs for a liquid lubricating and sealing medium, means to cool the liquid medium stored in said respective chambers, and mechanism to supply a regulated quantity of said cooled liquid medium to each of said respective cylinders during the earlier period only of compressing action.

In testimony whereof I have affixed my signature in presence of two witnesses.

CASPER W. MILES.

Witnesses:
B. R. KROPF,
WALTER F. MURRAY.