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ice-machine compressor.

1,249,822.

to all whom it may concern:

be it known that i, henry d. pownall, a citizen of the united states, residing at canton, in the county of stark and state of ohio, have invented certain new and useful improvements in ice-machine compressors, of which the following is a specification.

my invention relates to improvements in ice machine compressors. one of its objects is to provide an improved compressor in which the gas is admitted near the center of the cylinder and between two single acting plungers and expelled at opposite ends of the cylinder through downwardly directed exit ports arranged to take care of any liquid as well as gas which may enter the cylinder and to permit the gas and liquid to both be completely expelled therefrom.

another object is to provide improved means to prevent heat or efficiency losses and to provide an improved cooling or jacket system. another object is to provide an improved arrangement whereby the cylinder heads may be conveniently detached and the cylinder and parts therein contained made readily accessible. my invention also comprises certain details of form, combination and arrangement, all of which will be fully set forth in the description of the accompanying drawings, in which—

figure 1 is a central vertical longitudinal section through my improved compressor.

fig. 2 is a central vertical section on line a a of fig. 1.

fig. 3 is a top plan detail of one of the exit ports from the interior of the cylinder.

fig. 4 is a sectional detail through the cross-head guide on line b b of fig. 1.

the accompanying drawings illustrate the preferred embodiment of my invention in which a represents the cylinder supported upon a base 2. b represents a base or frame in which the driving or crank shaft 3 is journalled, and which also carries the cross head guides 4 and is bolted to the forward end of the cylinder outside of the cylinder head. c represents the plunger rod and d e represent the plungers rigidly mounted upon said rod. the ends of the cylinder are closed by heads e e'. f represents the gas intake pipe which taps an annular gas intake chamber b preferably formed integral with the cylinder, and from the lower portion of which gas inlet ports 7 lead to the interior of the cylinder.

the plungers each comprise a hub 8 and a ring 9 united by radial ribs 10 and thus providing an annular port or passage 12 for the gas between the hub and ring 9. an annular valve 11 seats upon the end or head of the plunger to open and close the port 12, and an annular keeper 14 is detachably secured to the head of the plunger to hold the valve in position, and to guide and limit its movement. the ring 9 is provided with metal packing rings 15 to form a tight joint between the plunger and cylinder wall.

the cylinder heads are capped on their inner faces with beveled edges 16, and the plunger valves and their keepers are correspondingly beveled so that at the end of the plunger stroke there is practically no space or clearance between the cylinder heads and plungers. offsets are provided between the meeting faces of the heads and cylinder to receive narrow packing rings 17, which are confined upon all sides so that they cannot flatten out or escape, and hence enable tight joints to be secured with light strains on the bolts which lock the heads in place. the gas exit ports 19 are located at the extreme end of the plunger travel and the beveled edges 16 of the heads are provided with channels 18 leading from the cupped or central portions of the heads to said ports which insure an exit for the last portion of either gas or liquid as the plungers complete their stroke and come practically into contact with the faces of the cylinder heads. the exit valve chambers are preferably formed integral with the cylinder and provided at their lower ends with caps 20 through which the exit valves and their cages and seats may be removed when required. offtake pipes 21 are tapped into the sides of said chambers. exit valves 22 close the exit ports 19 as close to the inner cylinder wall as practicable.

at the forward end of the cylinder the flange 24 to which the cylinder head is bolted is extended outwardly from the periphery of the cylinder head to afford an engaging face for the end of frame b and to which it is firmly secured by bolts 5. this arrangement of parts enables the forward cylinder head to be disconnected and partly or wholly removed through the channel of the cross head guides thus giving access to...
the forward end of the cylinder without dis-
connecting the cylinder from the frame B.
Where the cool gas enters the intake cham-
ber 6 and the central portion of the cylinder
between the plungers there is a refrigerating
effect or a tendency for the cool gas to take
up heat and thus reduce the efficiency of the
compressor, which tendency is reduced to a
minimum by providing outwardly project-
ing annular flanges 25 at the limits of this
section of the cylinder and enclosing the cy-
inder within these flanges with a belt of in-
sulating material 26 such as cork for in-
stance. This belt may if desired be extended
5 entirely around the cylinder but ordinarily
as the space within the base 2 of the cylinder
is a closed air space or pocket, and therefore
a good insulating material, no insulating
material other than said air space is em-
ployed within the base 2.
From the flanges 25 to the respective ends
of the cylinder the tendency is for the cy-
inder walls to become heated to temperatures
above the normal atmospheric temperature,
which increase progressively toward the ends
of the cylinders, while the cylinder heads
tend to become still more highly heated.
The tendency of this high temperature in
the ends of the cylinder is to heat the cool
gas as it enters the ends of the cylinder and
thus reduce the efficiency of the compressor.
This tendency to heat is counteracted as far
as possible by providing annular water jects
27 and 28 surrounding the ends of the
cylinder and independent water jackets 29
and 30 in the respective cylinder heads.
Separate water supply pipes 31 and 32
controlled by valves 33 and 34 supply water
respectively to the lower portions of jackets
37 and 28 to cool the ends of the cylinders,
and separate water supply pipes 35 and 36
controlled by valves 37 and 38 supply water
respectively to the lower portions of the
jackets 29 and 30 to cool the cylinder heads.
The water in the respective jackets as it
becomes heated rises to the upper portions
of said jackets where it escapes through
branch exit pipes 39 and 40 at each end
which for convenience unite into one com-
mon exit pipe 41 at each end of the cylinder.
This arrangement enables the amount of
cooling water supplied to the respective jects
to be varied, depending upon the tem-
perature of the cooling water, the external
temperature, and the work being done by the
compressor, and also enables relatively dif-
fent amounts of cooling water to be sup-
plied to the several jackets according to their
requirements, thus securing an increased
compressor efficiency.
The mechanism herein illustrated and de-
scribed is capable of considerable modifi-
cation without departing from the principle
of my invention.
Having described my invention, what I claim is:
1. An ice machine compressor comprising
a cylinder having a centrally located gas in-
take port and cylinder heads and gas exit
ports at opposite ends thereof, plungers reciprocating
in said cylinder on opposite sides of said
gas intake port to compress and discharge
gas at opposite ends of said cylinder, a belt
of insulating material protecting the central
portion of said cylinder exteriorly, and sepa-
rate annular water jackets encircling oppo-
site ends of said cylinder, separate water
jackets located in the respective cylinder
heads, said respective cylinder and head
jackets being each provided with an inde-
pendent valve controlled water supply con-
duit to provide for an independently ad-
justable water supply.
2. An ice machine compressor comprising
a cylinder having a centrally located gas in-
take port and cylinder heads and gas exit
ports at opposite ends thereof, separate plungers in
said cylinder on opposite sides of said gas
intake port reciprocating toward and from
said intake port, separate water jackets in
the cylinder walls at opposite ends of said
the cylinder, and separate water jackets in
the respective cylinder heads, said respective cy-
linder and head jackets being each provided
with an independent valve controlled water
supply conduit.
3. An ice machine compressor comprising
a cylinder having a centrally located gas
intake port and cylinder heads and gas exit
ports at opposite ends thereof, separate plungers
reciprocating in opposite ends of said
cylinder toward and from said gas intake
port to compress and discharge gas at oppo-
site ends of said cylinder, a belt of insul-
ating material to protect the central por-
tion of the cylinder from acquiring heat ex-
ternally, independent water jackets encir-
cling opposite ends of said cylinder to re-
move heat from the cylinder ends and in-
dependent water jackets located in the cy-
linder heads to remove heat therefrom, said
water jackets being each provided with an
independent valve controlled water supply con-
duit to provide for a variable water sup-
ply to the several jackets.
In testimony whereof I have affixed my
signature in presence of two witnesses.

HENRY D. POWNALL.

Witnesses:

David B. Day,
James K. Lynch.

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