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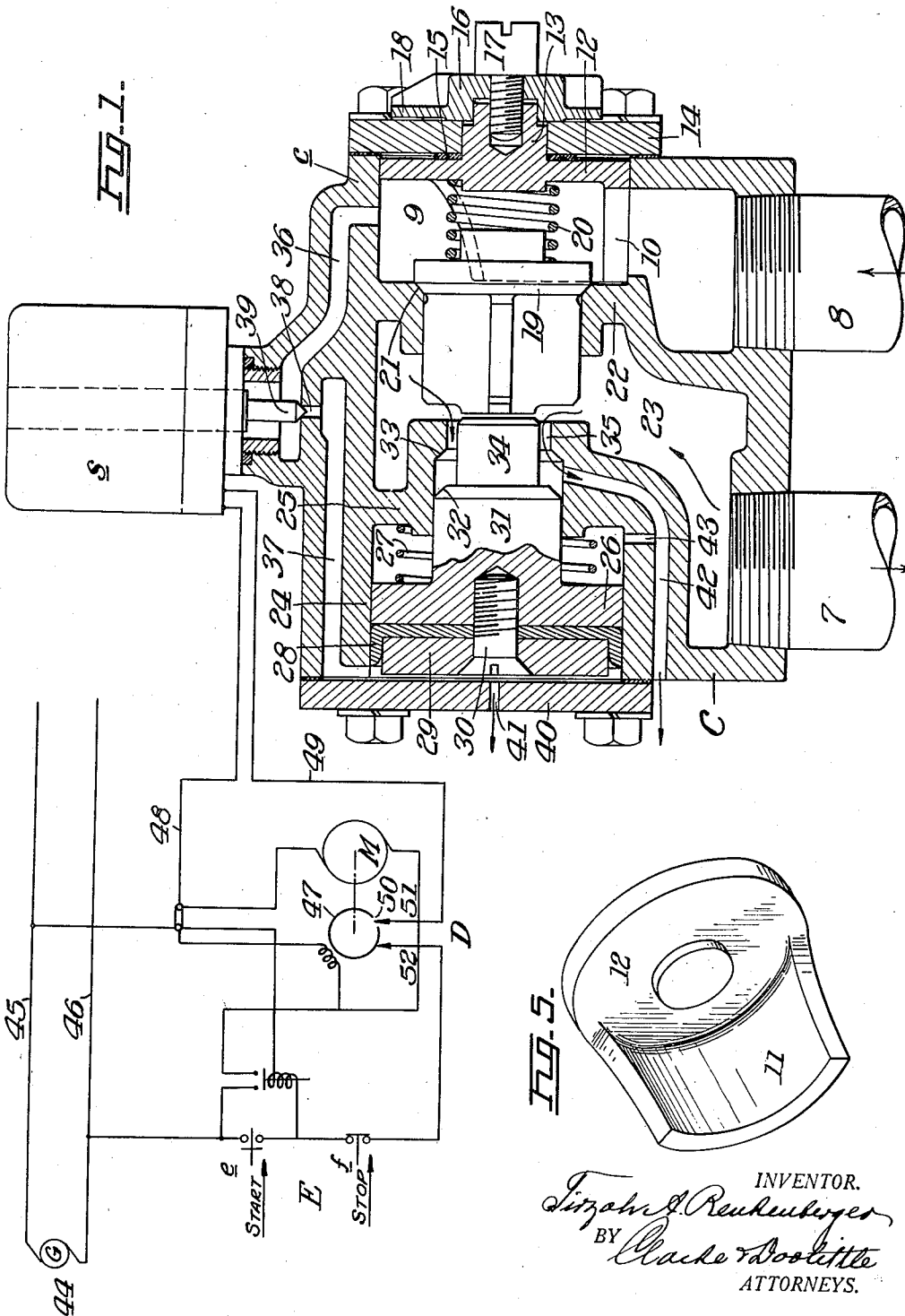
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2,097.201

TIMING VALVE

Filed May 19, 1936

2 Sheets-Sheet 1



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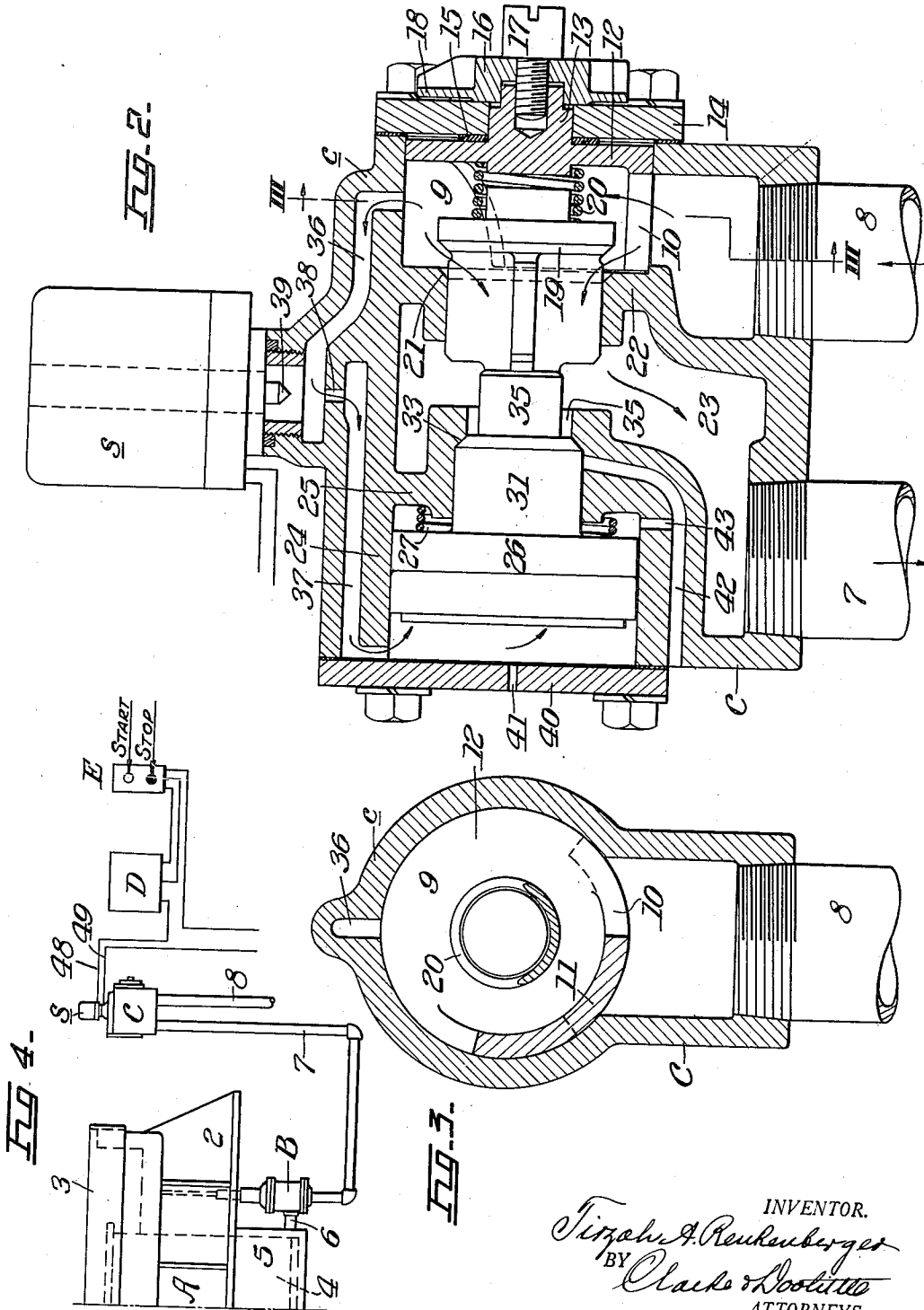
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UNITED STATES PATENT OFFICE

2,097,201

TIMING VALVE

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Application May 19, 1936, Serial No. 80,645

15 Claims. (Cl. 137—139)

My invention relates to improvements in fluid actuated timing valves, particularly designed for use in connection with a foundry flask bumping machine or the like, wherein it is desirable to operate the machine for a definite length of time, thereby imparting the required number of flask agitating movements for each complete operation.

The invention has in view to provide a timing valve mechanism by which pressure may be applied to a fluid actuated machine, operable to regulate the passage of fluid thereto, as controlled by regulating means governing the circulation of fluid through the valve, for timed application of pressure to the machine.

While as herein disclosed the invention is applied to the operation of a bumping machine, it is not limited to such application, and may be utilized in connection with any other adaptable mechanism, or with otherwise controlled regulating means than as herein shown for effecting its operation or discontinuance thereof.

In the application and use of the invention as here illustrated, the objects in view are accomplished by initiating pressure supply by a controlling switch through an electric relay and an adjustable timing device operating to interrupt the opening circuit and cause the pneumatic valve to close, shutting off pressure supply to the fluid pressure actuated machine.

Additional objects and advantages of the invention will be apparent from the following description in connection with the accompanying drawings. The present invention is an improvement in the type of timing valve disclosed in patent of Robert F. Ringle No. 1,956,962.

Referring to the drawings:—

Fig. 1 is a vertical sectional view of the timing valve in normally closed position, the controlling mechanism being shown diagrammatically;

Fig. 2 is a similar view of the valve showing it in open position for pressure supply;

Fig. 3 is a vertical section on the line III—III of Fig. 2;

Fig. 4 is a diagrammatic view illustrating the application of the timing valve to a bumping machine;

Fig. 5 is a perspective detail view of the inlet flow-controlling valve.

Referring to the drawings, a bumping machine is shown at A, comprising a base 2 for mounting a reciprocable bumping table 3 for flask agitation. The bumping machine is motivated by means of a piston or plunger 4 of table 3 disposed within a cylinder 5 incorporated in the

base, for actuation by any suitable fluid under pressure, as air, through a conduit 6. Such fluid is intermittently supplied to and exhausted from the cylinder by means of any suitable construction, as a valve B, to provide the bumping action, as will be readily understood.

For the purpose of controlling the operation of the bumping machine A by regulating the flow of fluid to valve B, I provide the improved timing valve generally designated C.

An outlet conduit 7 connects timing valve C with the intake side of automatic valve B, and an inlet conduit 8 connects it with any suitable fluid pressure source, as for example an air compressor system.

Inlet conduit 8 communicates with a valve-controlled cylindrical chamber 9 of casing c through the variable volume opening 10 at one side of the annular closing wall 11 of an adjustable flow-controlling valve 12, journaled in the chamber. The circular disk of rotatable valve 12 fits closely and rotatably in the end wall of the casing and forms a chamber-confining extension of the end wall.

The outer hub or stem 13 of valve 12 is journaled in head 14 of the valve chamber with an intervening sealing gasket 15 of copper or the like. The valve is tightly and rotatably connected with an outer indicator 16 by a screw or bolt 17, and the indicator has a pointer 18 operable around a position-indicating dial on the face of cap 14. By such construction the opening 10 for circulation from inlet conduit 8 may be varied or entirely closed by rotation of the controlling valve 12 and its peripheral wall 11.

Circulation from chamber 9 to outlet conduit 7 is controlled by valve 19, normally closed by spring 20 against seat 21 of a transverse partition wall 22, as in Fig. 1.

When valve 19 is unseated, as in Fig. 2, circulation of fluid pressure passes through chamber 23 to supply conduit 7 and to the bumper cylinder supply valve B. At the opposite side of the casing c of valve C it is provided with a cylinder 24, in alignment with and forming an extension of the casing beyond a partition wall 25 forming the other enclosing wall of circulation chamber 23.

A piston or plunger 26 is mounted in cylinder 24, normally retracted by closing action of valve 19, or back pressure from conduit 7, or if desired by spring 27. The plunger is provided with a packing leather 28 and head 29, secured by bolt 30.

The plunger has an inward extension 31 with a valve face 32 adapted to open from and close against a valve seat 33 in a cylindrical receiving extension of partition 25. Also an abutment 34 extends therebeyond through enlarged opening 35 for abutting engagement against valve 19 for opening it, as in Fig. 2.

The valve casing c is provided longitudinally of its upper portion with ports 36 and 37 communicating respectively with chamber 9 and cylinder 24, through an intervening valve controlled port or opening 38. The inner end portions of ports 36 and 37 overlap each other with an intervening partition through which the port 38 extends connecting the overlapping ports 36 and 37. Mounted on casing c is a solenoid magnet s of well known construction, having a reciprocally actuated terminal valve 39 operable to open and close opening 38 as controlled by the regulating and actuating means, push button station E, and electric timing station D.

The outer end of cylinder 24 is closed by a head 40 having a reduced exhaust port or weep hole 41, facilitating reverse movement of the plunger upon closing of circulation establishing opening 38.

Likewise, a similar reduced port 42 communicates with the atmosphere and with chamber 23 through annular space 35, and also with the cylinder 24 behind the plunger 26 through port 43, to relieve back pressure from conduit 7, chamber 23 and cylinder 24 upon termination of the bumping operation.

It will thus be seen that upon retraction of valve 39 by energizing solenoid s, admitting pressure to plunger 26, its extension 34 will abut against and open valve 19, opening and maintaining fluid pressure circulation to the bumper control valve B until valve 39 is again closed upon de-energizing solenoid s, terminating the operation. The solenoid s is designed to be energized for any desired operating period, timed to suit the rapidity and extent of operation, dependent on the volumetric admission of fluid circulation as controlled by valve 12 and its annular wall 11, and the time period of flow, according to its desired use.

It will be understood that the stem of valve 39 is connected with the armature of the solenoid magnet s, the winding field of which is energized by current from a generator 44 by conductors 45 and 46 under control of the electric timing station circuits D and the start and stop contacts E (see Fig. 1).

An interrupter drum 47 provided with a circuit breaking gap is driven by synchronous motor M through suitable gearing, adapted to start as soon as the circuit to the motor is closed, and to terminate after the lapse of a predetermined time.

Upon closing the starting contacts e motor M and the solenoid s will be energized, and a normally closed emergency stop contact f is provided in the interrupter drum circuit.

Rotation of the interrupter drum 47 will maintain a closed circuit with the solenoid magnet through conductors 48, 49, until the stop gap 50 breaks the contact with one of the terminals 51, 52.

Thereupon solenoid valve 39 will close opening 38, valve 19 will seat under pressure from conduit 8 and spring 20, and will recede plunger 26, with free escape of latent pressure through ports 41 and 42, as in Fig. 1, when the bumping machine will stop.

Upon opening of the control circuit the drum 47 returns immediately to its starting position by torsional spring action, temporarily interrupted during the maintenance of circuit to solenoid s, ready for the next operation. It will be understood that the degree of rotation of drum 47 is determined by a timing adjustment to a graduated scale on the drum, and relay controlled recycling for each new cycle of operation, as embodied in the commercially available telechron synchronous motor equipment shown in diagram. Such portion of the installation forms no part of the present invention, and it will be understood that, if desired, the operation of solenoid s may be otherwise controlled, or that valve 39 may be operated mechanically, if preferred.

The construction and operation of the valve for the purpose of effecting timed application of pressure to a utilizing means will be readily understood from the foregoing description.

The design, arrangement and proportions of the mechanism may be variously changed or modified as to location of the valve members, circulating ports, or in other details by the skilled mechanic, but all such changes are to be understood as within the scope of the following claims.

I claim:

1. A timing device for application of fluid pressure consisting in the combination of a casing having an inlet chamber and an outlet chamber, a valve between said chambers, a separate oppositely disposed plunger in abutting relation to said valve, said casing having a pair of communicable ports connecting the inlet chamber with the plunger through a valve controlled opening, a valve for said opening, and means for actuating said valve to open and close circulation through said ports and opening.

2. A timing device for application of fluid pressure consisting in the combination of a casing having an inlet chamber and an outlet chamber, a valve between said chambers, a separate oppositely disposed plunger having an abutting terminal adapted to open said valve, said casing having a pair of communicating ports connecting the inlet chamber with the plunger through a valve controlled opening, a valve for said opening, and means for actuating said valve to open and close circulation through said ports.

3. A timing device for application of fluid pressure consisting in the combination of a casing having an inlet chamber and an outlet chamber, means forming an end wall of the casing regulating flow to the inlet chamber, a valve between said chambers, a separate oppositely disposed plunger having an abutting terminal adapted to open said valve, a pair of ports connecting the inlet chamber with the plunger through a valve controlled opening, a valve for said opening, and means for actuating said valve to open and close circulation through said ports.

4. A timing device for application of fluid pressure consisting in the combination of a casing having an inlet chamber and an outlet chamber, a rotatable valve having a circular base forming an end wall of the casing regulating flow to the inlet chamber and having an exterior indicator, a valve between said chambers, a separate oppositely disposed plunger having an abutting terminal adapted to open said valve, retracting means for the plunger, said casing having a pair of communicating ports connecting the inlet chamber with the plunger through a valve controlled opening, a valve for said opening, and

means for actuating said valve to open and close circulation through said ports.

5. A timing device comprising in combination a cylindrical casing provided at one end with an inlet chamber and a valve controlling flow thereto, a middle outlet chamber, a valve seated partition between said chambers, a valve therefor, an oppositely located cylinder, an independent plunger therein having an abutting terminal operable to unseat the partition valve, a pair of ports in the casing communicating with the inlet chamber and cylinder respectively and with each other through a valve controlled opening, and an opening and closing valve therefor.

6. A timing device comprising in combination a cylindrical casing provided at one end with an inlet chamber, a rotary valve closing the end wall of the casing and controlling flow therethrough provided with an external indicator, a middle outlet chamber, a valve seated partition between said chambers, a valve therefor, a seating spring for said valve between it and the rotary valve, a cylinder in the opposite end of the casing, an independent plunger therein having an abutting terminal operable to unseat the partition valve, a pair of ports in the casing communicating with the inlet chamber and cylinder respectively and with each other through a valve controlled opening, and an opening and closing valve therefor.

7. A timing device comprising in combination a cylindrical casing provided at one end with an inlet chamber, a rotary valve controlling flow therethrough provided with an external indicator, a middle outlet chamber, a valve seated partition between said chambers, a valve therefor, a seating spring for said valve between it and the rotary valve, a cylinder in the opposite end of the casing, an independent plunger therein having an abutting terminal operable to unseat the partition valve, ports in the casing communicating with the inlet chamber and cylinder respectively and with each other through a valve controlled port, an opening and closing valve therefor, and ports extending through the casing to its exterior for exhausting fluid pressure from the middle chamber and from the cylinder.

8. In combination with a valve casing having at one end a plunger cylinder and at the other end an inlet chamber, a middle outlet chamber and a flow controlling valve, an independent unseating plunger for said valve provided with an exhaust port controlling valve between the inlet and outlet chamber, and circulating plural ports connecting the inlet chamber with the plunger through a valve controlled opening; a valve therefor, and electrically controlled means for opening said valve.

9. In combination with a valve casing having at one end a plunger cylinder and at the other end an inlet chamber, a middle outlet chamber and a flow controlling valve, an independent unseating plunger for said valve provided with an exhaust port controlling valve between the inlet and outlet chamber, and circulating plural ports connecting the inlet chamber with the plunger through a valve controlled opening; a valve therefor provided with an actuating magnet, and electrically controlled means for energizing and de-energizing the magnet.

10. In combination with a valve casing having at one end a plunger cylinder and at the other end an inlet chamber, a middle outlet chamber and a flow controlling valve, an in-

dependent unseating plunger for said valve provided with an exhaust port controlling valve between the inlet and outlet chamber, and circulating plural ports connecting the inlet chamber with the plunger through a valve controlled opening; a valve therefor provided with an actuating magnet, and electrically controlled means for energizing the magnet for a predetermined period and for de-energizing it at the termination thereof.

11. In a timing device for application of fluid pressure the combination of a cylindrical casing having at opposite ends an inlet chamber and a plunger cylinder, a middle outlet chamber, a rotary valve in the inlet chamber controlling circulation therethrough, a reciprocable valve controlling circulation from the inlet chamber to the outlet chamber, a seating spring therefor between it and the inlet chamber valve, a plunger in the plunger cylinder having a terminal engageable with the reciprocable valve, overlapping independent ports connecting the inlet chamber with the plunger cylinder through an intervening valve controlled opening, and an opening and closing valve for said opening.

12. In a timing device for application of fluid pressure the combination of a cylindrical casing having at opposite ends an inlet chamber and a plunger cylinder, a middle outlet chamber, a rotary valve consisting of a circular head closing the end of the inlet chamber having an inwardly extending part circular extension controlling circulation through the inlet chamber and provided with an external indicator, a reciprocable valve controlling circulation from the inlet chamber to the outlet chamber, a seating spring therefor between it and the inlet chamber valve, an exhaust port in the casing, a plunger in the plunger cylinder having a terminal engageable with the reciprocable valve and an exhaust port controlling valve, plural ports connecting the inlet chamber with the plunger cylinder through a valve controlled opening, and an opening and closing valve for said opening.

13. In a timing device for application of fluid pressure the combination of a cylindrical casing having at opposite ends an inlet chamber and a plunger cylinder, a middle outlet chamber, a rotary valve in the inlet chamber controlling circulation therethrough and provided with an external indicator, a reciprocable valve controlling circulation from the inlet chamber to the outlet chamber, a seating spring therefor between it and the inlet chamber valve connecting the plunger cylinder with the atmosphere, an exhaust port in the casing, a plunger in the plunger cylinder having a terminal engageable with the reciprocable valve and an exhaust port controlling valve, a retracting spring for the plunger operative upon termination of closing pressure thereon to withdraw the exhaust port controlling valve and open exhaust to the atmosphere, ports connecting the inlet chamber with the plunger cylinder through a valve controlled opening, and an opening and closing valve for said opening.

14. In a timing device for application of fluid pressure the combination of a cylindrical casing having at opposite ends an inlet chamber and a plunger cylinder, a middle outlet chamber, an exhaust circulation opening through the inner portion of the plunger cylinder communicating with the atmosphere, a rotary valve in the inlet chamber controlling circulation therethrough, a reciprocable valve controlling circulation from

the inlet chamber to the outlet chamber and sub-
ject to inlet pressure, a plunger in the plunger
cylinder having a terminal engageable with the
reciprocable valve and a valve portion control-
5 ling exhaust circulation from the middle outlet
chamber to atmosphere, plural ports connecting
the inlet chamber with the plunger cylinder

through a valve controlled opening, and an open-
ing and closing valve for said opening.

15. A timing device as in claim 14 characterized
by an exhaust circulation port extending from
the plunger cylinder interior to atmosphere. 5

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