

H. H. Day.
Canal Lock.

Sheet 1-2 Sheets.

Nº 69,639.

Patented Oct. 8, 1867.

Fig: 3.

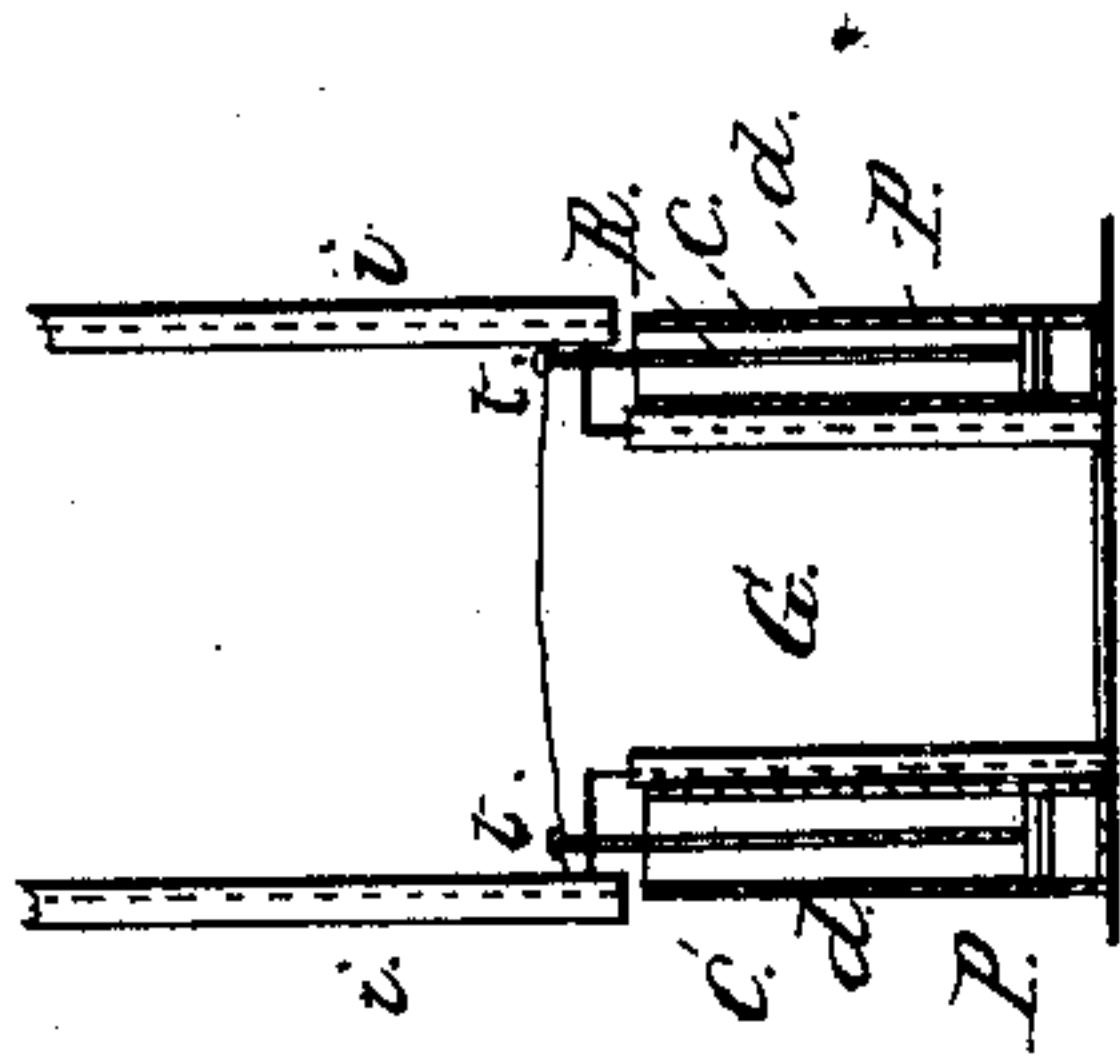


Fig: 4.

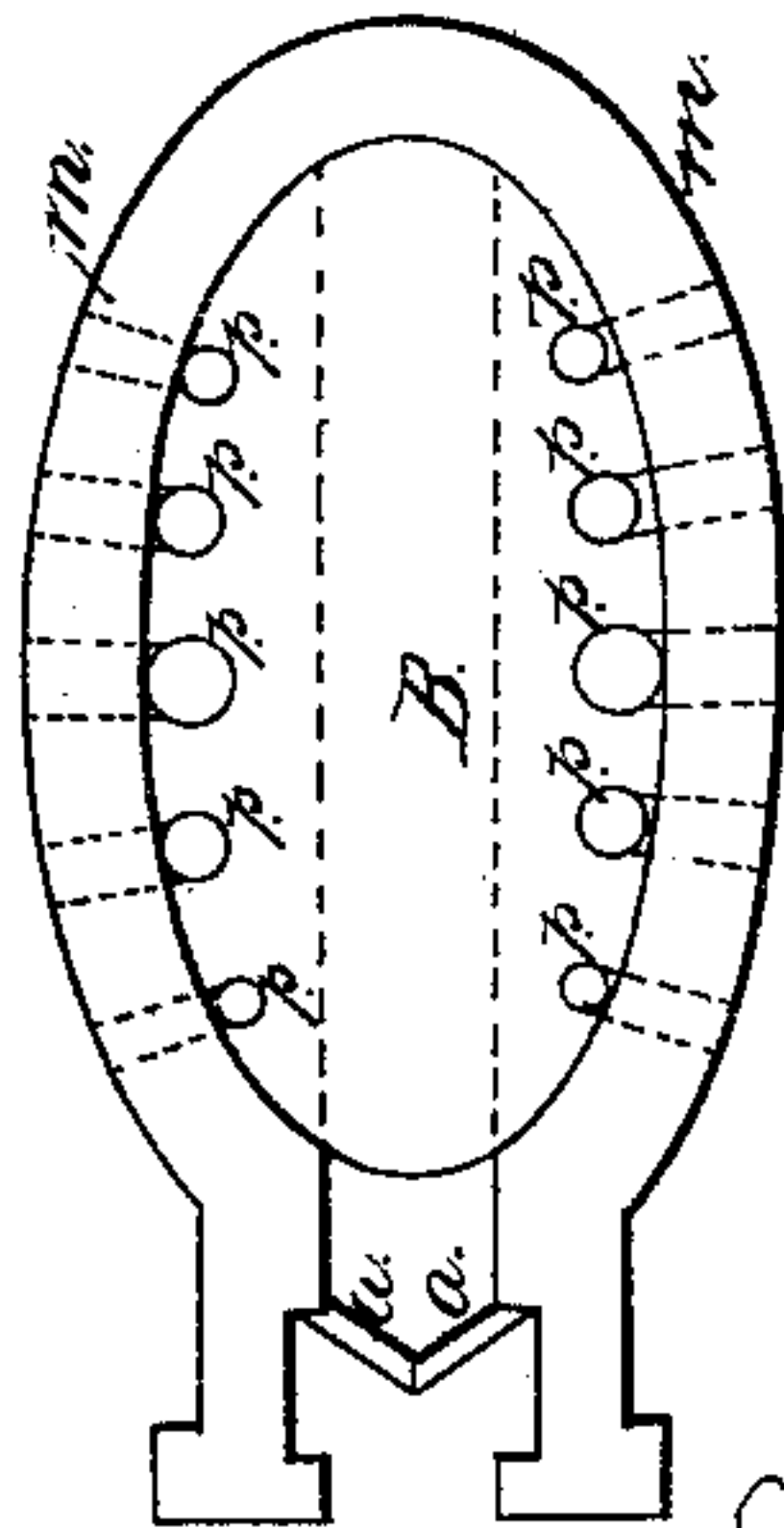


Fig: 5.



Fig: 1.

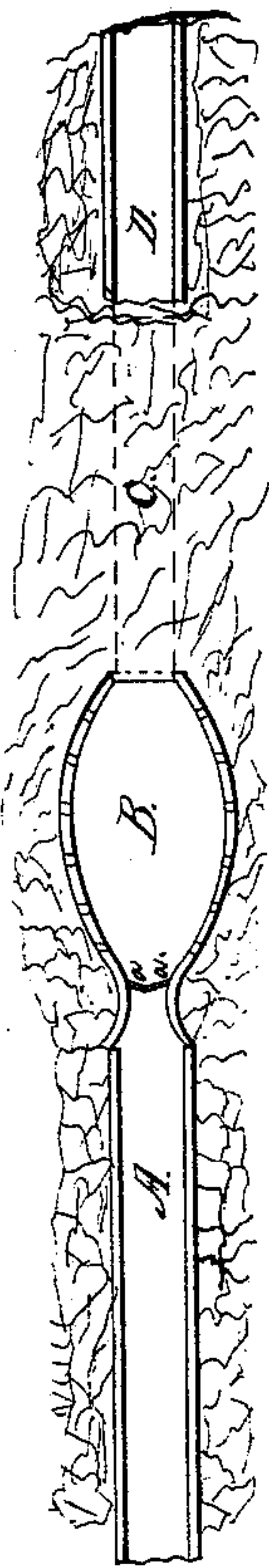


Fig: 2.

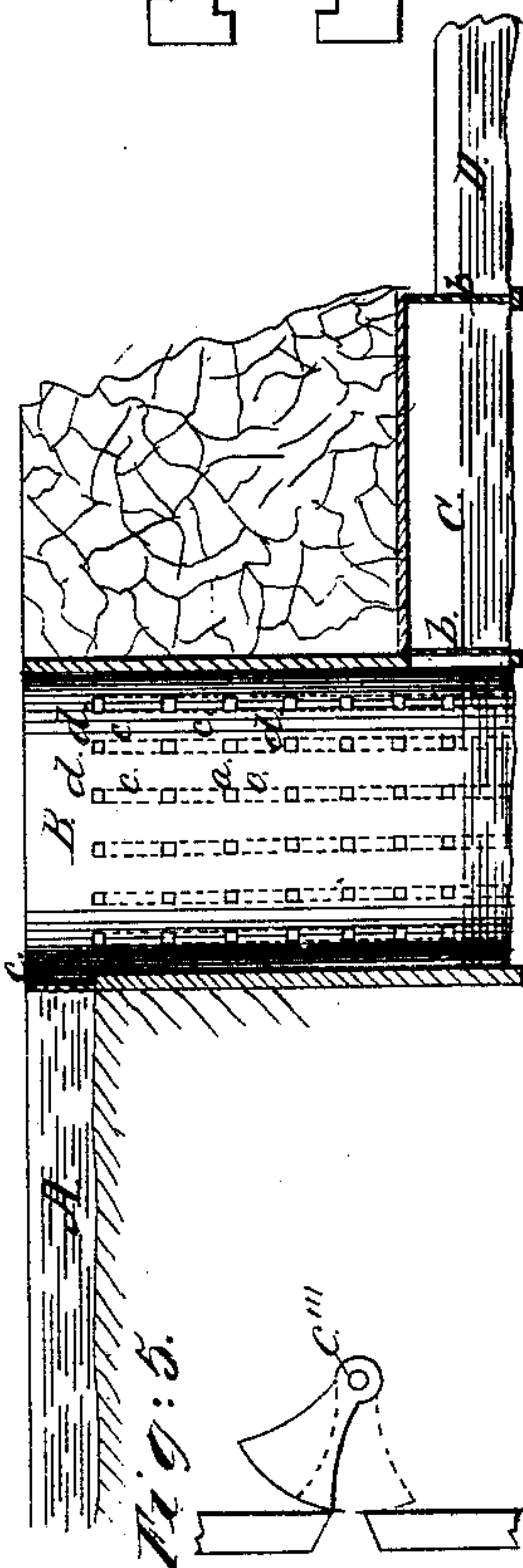
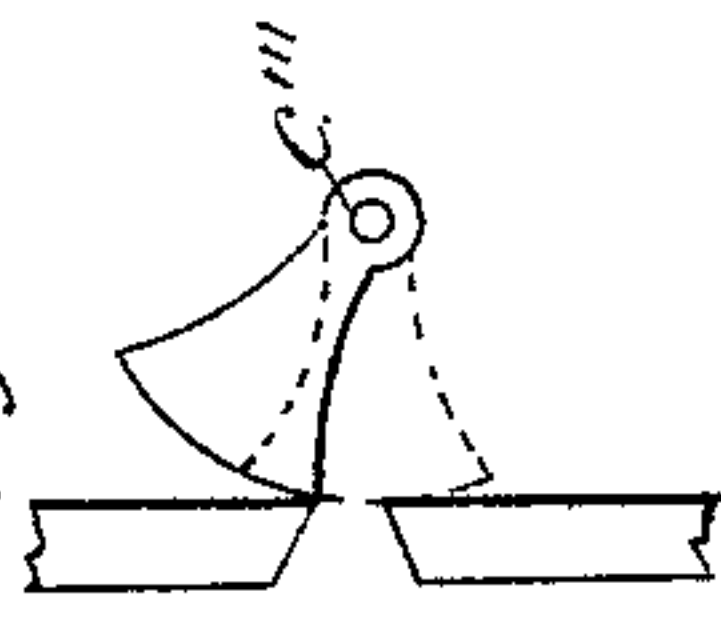


Fig: 5.



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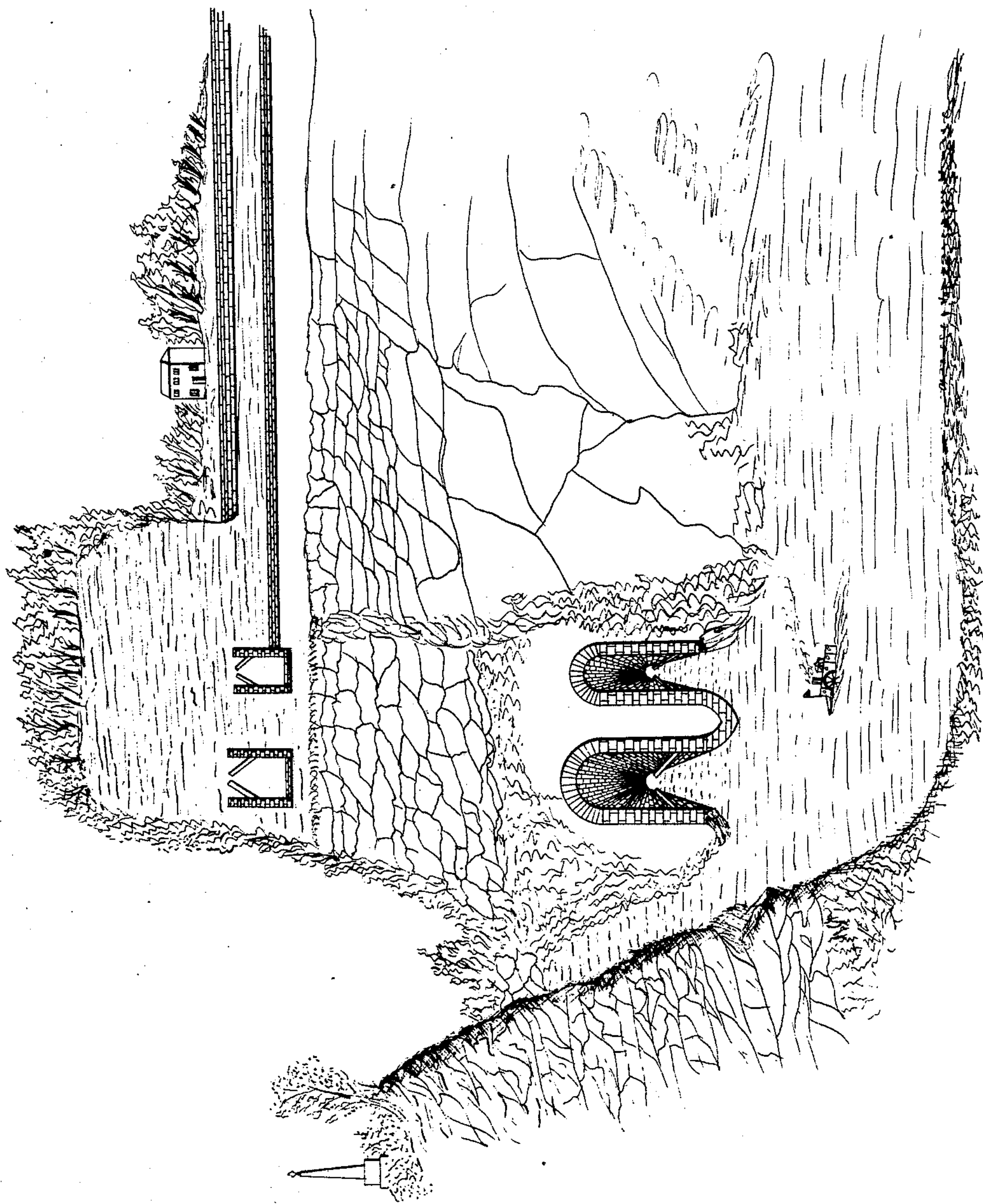
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Sheet 2-2 Sheets.

Canal Lock.

N^o 69,639.

Patented Oct. 8, 1867.



Witnesses:
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United States Patent Office.

HORACE H. DAY, OF NEW YORK, N. Y.

Letters Patent No. 69,689, dated October 8, 1867.

IMPROVEMENT IN CANAL-LOCKS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, HORACE H. DAY, of the city, county, and State of New York, have invented a new and useful Improvement in the Manner of Constructing Canal-Locks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters and figures marked thereon.

The nature of this invention relates to an improvement in the manner of constructing the locks of canals intended to be used where there is considerable difference of level, by means of which the passage of vessels from one level to another may be effected by a single lift, no matter how great may be the difference between the two levels, and the series of locks which it is usual to employ in such situations may be dispensed with, and by which the use of water is economized, in employing the water drawn off in lowering boats or vessels for again filling the lock below, to raise other boats or vessels.

The invention consists in the peculiar manner of constructing the single-lift lock which I propose to make use of, and in certain mechanical devices used in connection and forming part of the lock.

This peculiar form of lock is especially adapted to those canals which are constructed for the purpose of avoiding obstructions to the navigation of rivers, such as rapids and cataracts, and where the descent from the plateau forming the upper level to the level of the river into which the canal empties is abrupt, and the river banks are, in consequence, high and precipitous. The Niagara river, near Lewiston, affords a good illustration of this formation. The topographical features of the country are somewhat peculiar at this point. The river flows in a deep chasm or gorge, having precipitous and rocky walls, over three hundred feet in height, and on either side there is a level plateau, which, from being continuous with the level of the upper lakes, is known as the lake crest. It is evident that, owing to this peculiar formation, a canal connecting the river above the falls with the river below them can be constructed with but slight change of level, and with but few locks, until the canal nearly approaches the river bank, when, in order to communicate with the river, a lock or series of locks of great depth will be required. My lock is so constructed that but a single one is needed. It is peculiarly adapted to this locality, but there are many other situations, both in this country and in Europe, where a lock of this form can be constructed advantageously.

In order to enable those skilled in the art to construct my invention, I will now proceed to describe it more in detail with reference to the accompanying drawings, in which—

Figure 1 is a plan view.

Figure 2, a section, showing the lock-chamber and the upper and lower canals.

Figure 3, a plan of the lock-chamber.

Figure 4, a view of the main gate.

Figure 5, a view of one of the side gates.

Figure 6, a view of another form of side gate.

The same letters indicate similar parts in the several figures.

At the extremity of the canal, as near the river bank as possible, I make an excavation somewhat larger than the proposed lock-chamber, and I extend this excavation to a depth at least below the level of the river into which the canal enters. This excavation may be made of an elliptical form, and, should the nature of the soil in which the excavation is made so require, may be lined with masonry, timber, iron, or any other suitable material. The upper canal communicates with the lock-chamber by means of gates, which may be of any suitable construction, and may be operated in any suitable manner. The canal may be enlarged at this point so as to form a basin. In order to connect the lock-chamber with the river I make an opening in the end wall of the excavation, near its bottom, and drive a tunnel through the hill which forms the river bank, until the river is reached. This tunnel must be large enough to permit the passage of vessels of the largest size used in the canal navigation. The entrance to the tunnel is closed by gates, which may be constructed in any suitable form, and may be operated by any mechanical agency. I propose the use of hydraulic or hydrostatic power, and I will hereafter show and describe a form of gate which I consider especially applicable. By the use of the tunnel a deep cut is avoided, the necessity of a series of gates is obviated, and a lock-chamber is obtained which has end as well as side walls.

In the figures, A represents the upper canal, B the lock-chamber, C the tunnel, D the lower canal, *a a* and *b b* the upper and lower gates.

I will now proceed to describe the manner in which the lock-chamber is filled and emptied in order to effect the passage of vessels.

I do not propose to admit water through the main gates or entrances, as is usual, but I construct in the side walls of the lock-chamber a series of channels, or I place therein a series of pipes, which communicate with the canal above and below, through suitable conduits. These pipes are provided with a series of openings, placed at various heights—about twenty-five feet apart is considered proper—and these openings are closed by valves or gates, which may be operated by any mechanical agency. The form of these gates is not important, but I prefer that which I will hereafter describe. When it is desired to raise the water in the basin to the level of the upper canal, the water is admitted through these pipes from the canal above, and when it is desired to empty the basin or chamber, the water is discharged through these pipes, and flows through proper conduits or channels to those situations where it can be so utilized as to afford water-power. This is an especial advantage, as by my mode of emptying the chamber a waste of water is prevented.

The object of placing a series of gates at different heights in the channels is that the operation of the gates may be accomplished with ease, which would otherwise be done with considerable difficulty; that is, if the gates were at the bottom of the chamber they could not be readily opened, owing to the great pressure of water upon them. By having them situated at different points in the vertical channels, there need never be more than the pressure caused by a column of water twenty-five feet in depth upon them.

Figs. 1 and 2 show the pipes, *c c* indicating the pipes, *d* the gates. These side channels or pipes, and their series of valves or gates, are to be connected with conduits leading to side reservoirs, which may receive the water let off from the lock at one level, so that it may be used again, by letting back into the lock, at a lower level, for raising boats and vessels, thereby saving or utilizing the water, it may be several times over. Sometimes it may be found advantageous to allow the water to pass off by the lower gate, though, as I have before stated, this will not usually be done. In that case the main lower gate is to have a vertical movement, and by raising it a short distance the water will flow out underneath.

The elevation of the gate will be most easily effected by power derived from hydrostatic pressure, in the manner which I will proceed to describe with reference to fig. 3 of the drawings. *G* is the main gate, which is retained in place by the guides *d' d'*. At each side of the gate is a cylinder, *c'*, of a length nearly equal to the height of the gate, in which is a piston, *P*, and a piston-rod, *r*, the latter being firmly attached to the top of the gate at *t*. The water having been introduced from the canal by means of a proper conduit into the chambers under the pistons *P P*, they will rise, and will take with them the gate *G*, which is kept in place by the guides *i i*, attached, like the guides *d d*, to the walls of the lock-chamber. On discharging the water from the cylinders, the gate *G* descends by its own weight, and the opening is thereby closed. If the hydrostatic pressure thus obtained is inadequate to overcome the friction produced by the pressure upon the gate, it is to be lifted for a short distance only, in order to permit the escape of water. The gate being counterpoised, it may be raised to any height with ease, on being relieved from the pressure. The smaller gates, for admitting and discharging the water from the lock-chamber, will be worked more easily, wherever placed, by giving them a cylindrical form and a rotary motion. In fig. 6, *c''* is a cylinder, and *o* is the longitudinal opening in it for the passage of the water. *J J* are the journals upon which it revolves when in place. The boxes in which the journals move or rotate are attached to the large gates or to the sides or bottom of the lock, on each side of the aperture, and the latter is to correspond in size and form with the opening in the cylinder. A partial revolution of the cylinder closes or opens the aperture. Another form or modification of gate or valve is shown at fig. 5. In this form the gate is the segment of a cylinder, and revolves upon the journal *c''*. The opening is closed when the valve is in the position shown by the dotted lines. The rotary movement of the gates may be effected by any proper agency.

To exhibit more fully the manner of conveying the water from the canal above to the lock-chamber, and the method of lining the chamber, in order to protect from atmospheric action the face of the rock exposed by the excavation, reference must be had to fig. 4, which is a plan of the lock. *m m* is the wall, of masonry, forming a double arch, compactly laid in cement, and capable of resisting the pressure of the water, should any find its way between the lining of masonry and the face of the rock when the chamber is empty. *p p* represent the pipes, which may be of different sizes, the largest being near the centre. These pipes may be formed in the masonry, or vertical channels excavated in the face of the rock may be used. It may be considered desirable to place one or two lift-locks between the tunnel and the river; in this case the bottom of the lock-chamber will be above the level of the river, and the gates will be more readily accessible for purposes of repair.

The operation of this lock is as follows: Supposing it is desired to pass a vessel from the upper to the lower canal, the water in the chamber being on a level with the upper canal, the entrance-gates are opened and the vessel passes into the lock-chamber. The gates are then closed, and one series of side gates opened, until the water sinks to their level; another series is then opened, and so on until the vessel has sunk to the level of the lower canal, when the lower main gate is opened, and the vessel passes through the tunnel to the river. It is possible to place in the mouth of the tunnel, where it unites with the lock; any number, any four or five pair of ordinary lock-gates, one pair above another, which may swing upon proper supports after the water has been removed. It may be found advantageous to pass, by means of pipes or other channels, the water from one lock to another, on the principle of a siphon.

Having now described the nature of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A canal-lock constructed and operating in the manner substantially as and for the purposes herein described.

2. I claim in a canal-lock, constructed as above, the pipes or channels placed in or at the sides of the lock-chamber, and used for filling and emptying the same, substantially as and for the purposes herein described.

3. I claim series of valve-openings at certain different heights, in combination with said pipes or channels, for the purpose of letting the water into and out of the canal-lock successively, at said different heights, as herein specified.

4. I claim, in combination with the said canal-lock, the construction and arrangement of the vertical main gate or gates, to be operated by hydrostatic power, and constructed substantially as described.

HORACE H. DAY.

Witnesses:

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