chamber of the gun the platform I may be allowed to descend by its own gravity by easing the pressure on the lever R.

The recoil movement of the cannon upon the chassis is controlled and limited by an automatic differential mechanism, which presents a resistance to the movement that increases rapidly with the space passed over. This effect I accomplish by means of the binder T, Figs. 8 and 13. The lower gibs, *m m*, of this binder take under the inner projecting ledges of the chassis, as shown in Fig. 8, (which is a cross-section in the axial line of the trunnions through the cannon, carriage, and chassis.) Within this binder there is a strong spring of plates or leaves of steel, or a strong spring of any suitable material, which rests on the eccentric-shaft V, and the tension or force of this spring is regulated by the screw W, which bears upon it, as shown in Figs. 8 and 13.

When the gun is in position for firing, the bearing-wheels of the gun-carriage are lifted clear of the top surface of the chassis, and the eccentric X, Fig. 1, is made to elevate the rear end of the inclined plane Y, Fig. 1, upon which the end of the lever Z, Figs. 1 and 7, has a bearing.

During the recoil of the gun the inclined plane Y causes the lever Z to partially rotate on its axis as it moves up the incline, thus causing the eccentric or large side of the shaft V, Figs. 13 and 14, to impinge against the ends of the spring, thereby causing the holding-gibs of the binder to bear with increasing force against the under side of the ledges of the chassis until, by the time the gun-carriage has reached nearly the end of the chassis, the friction or bite of the holding-gibs has completely neutralized the force of the recoil.

In order to release the gun-carriage so as to advance the gun into battery, the eccentric X is dropped to its lower center, thereby lowering the inclined plane Y. The lever Z is then moved forward sufficiently to release the binder and raise the gun and carriage on the wheels.

The new mode of loading and firing heavy ordnance and the means for that purpose herein described not only enable these operations to be executed with great rapidity and accuracy, but the men who are engaged in the work are protected while so employed, as the operations are conducted and performed below the level and under the protection of the parapets, except the sighting of the piece.

I do not, however, confine myself to the exact details of arrangement and construction which I have herein described, but claim the right to vary the same as circumstances or convenience may require, so long as I confine myself within the purview of my invention.

I shall now describe the manner of manipulating or handling a heavy cannon arranged according to this system, which may be accomplished by a force of less than thirty men, divided into squads, with special duties assigned to each, as follows:

Squad No. 1, consisting of two men, shall put the load on the shot-carriage and run it upon the elevator. Their position is near the front of the gun.

Squad No. 2, consisting of ten men, stationed at the rear of the gun, shall elevate the load to the muzzle of the gun by hauling on the elevator-lanyard; and, secondly, they shall draw the load or charge into the chamber of the gun by hauling on the loading-lanyard.

Squad No. 3 (one man) stands in front, to the right of the muzzle of the gun. His first duty is to remove the swab from the loading-rod when it has been pushed out of the gun. His second duty is to place a new swab on the loading-rod. His third duty is to guide the loading-rod through the central tube of the cartridge into the threaded aperture in the shot or shell; and, lastly, when the load or charge has been drawn into the gun, he will release the elevator-platform, so that it may descend by its own gravity to its recess in the turn-table to receive another load or charge.

Squad No. 4 (one man) will take charge of the firing-piece, and will immediately remove the same from the gun after its discharge. He will then prepare it for firing, and will insert it in the breech of the gun when the loading-rod is removed.

Squad No. 5 (one man) has charge of the loading-rod. His first duty, on the removal of the firing-piece after the discharge of the gun, is to introduce the loading-rod through the rear aperture, encountering the swab with the shoulder of the rod, and pushing it forward till it emerges from the muzzle, thereby cleaning out the chamber of the gun. His second duty is, when the small part of the loading-rod has passed through the load or charge, to rotate the rod by the hand-wheel till it is screwed home into the shot or shell. His third duty is to hold the hand-wheel close to the breech of the gun, while squad No. 2 draws the charge home in the chamber by hauling on the loading-lanyard. His fourth duty is to disconnect the loading-rod from the projectile by a reverse movement of the hand-wheel, and then withdraw the loading-rod from the gun, when immediately squad No. 4 will insert the firing-piece.

Squad No. 6, consisting of eight men, manages the levers of the wheels of the gun-carriage and chassis. Their first duty, immediately after the firing of the gun, is to drop the inclined plane and disengage the griping device that controls the recoil. Their second duty is, as soon as the charge or load has been drawn into the chamber, to advance the gun into battery; and their third duty is to readjust the recoil-controlling apparatus.

The training of the gun to right or left, the elevating of the charge, and the disengaging of the recoil-controlling apparatus may be all performed in the time occupied in sighting the gun.

It is thus manifest that the interval of time between the discharges of the gun may be

J. O. DONNER.

Apparatus for the Manufacture of Hard Sugar.

No. 209,029. Patented Oct. 15, 1878.

Fig. 3.

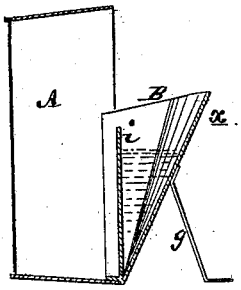


Fig. 1.

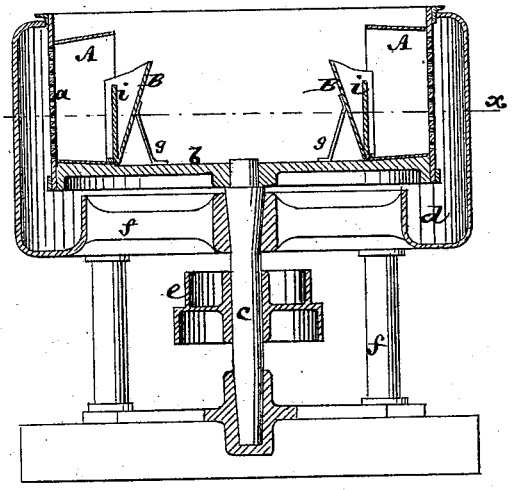


Fig. 4.

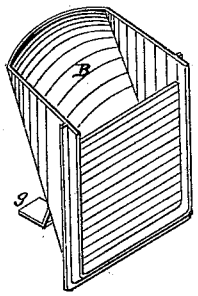


Fig. 2.

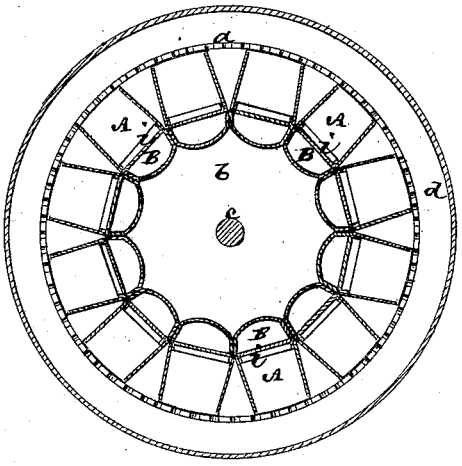


Fig. 5.

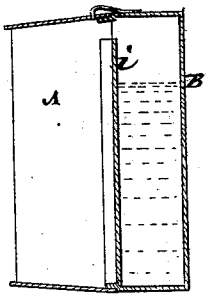


Fig. 6.

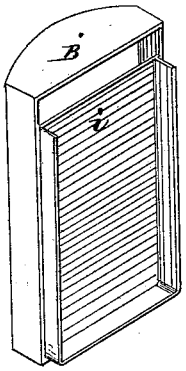
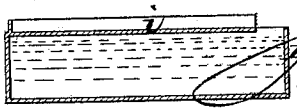


Fig 7.



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