(No Model.) 2 Sheets—Sheet 1.

H. W. R. STRONG.

METHOD OF AND MEANS FOR IMPOUNDING DEBRIS AND STORING WATER.

No. 528,823. Patented Nov. 6, 1894.

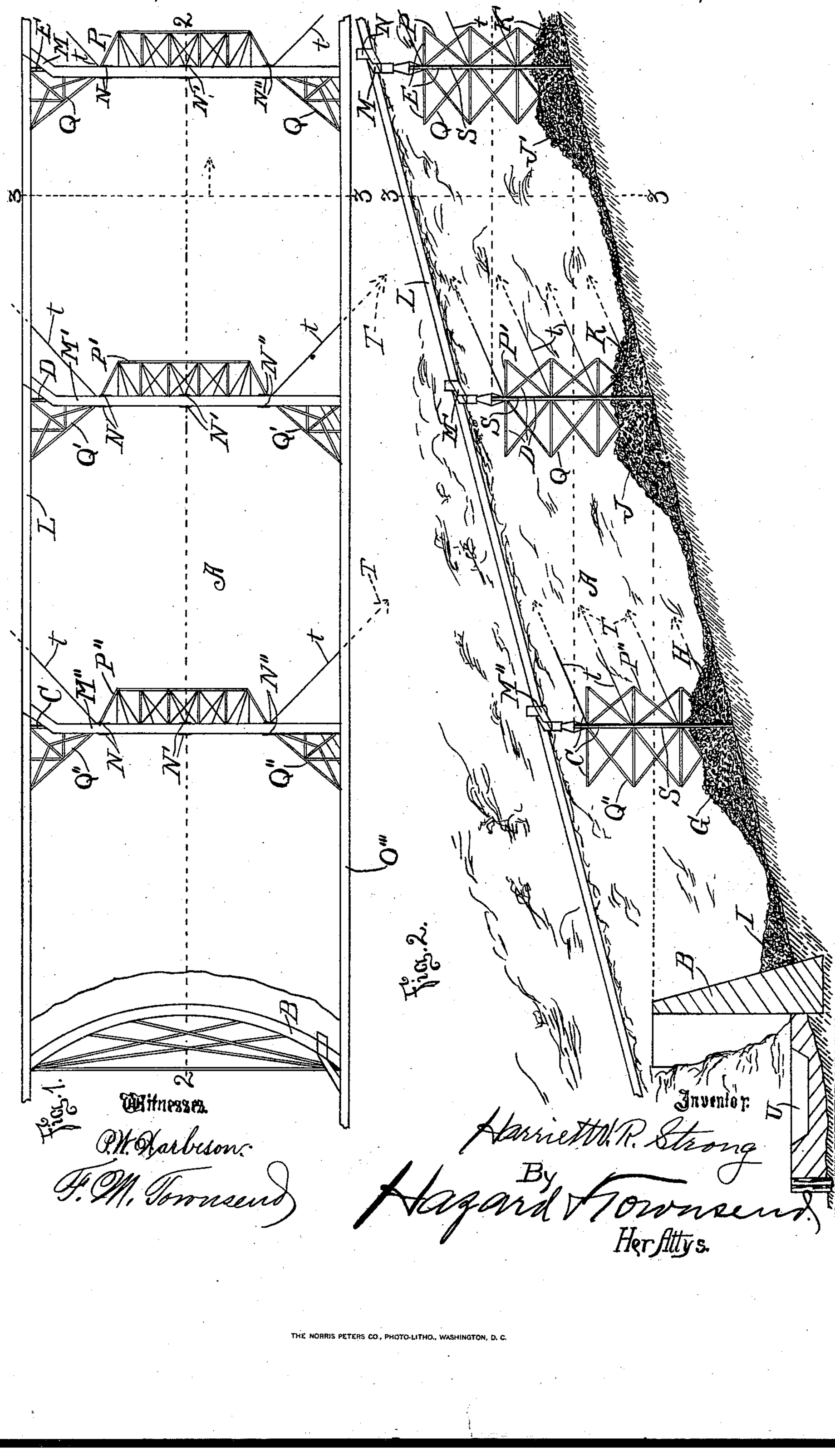

Fig. 1.

Witnesses.

P. W. Harbeson.

F. M. Townsend

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

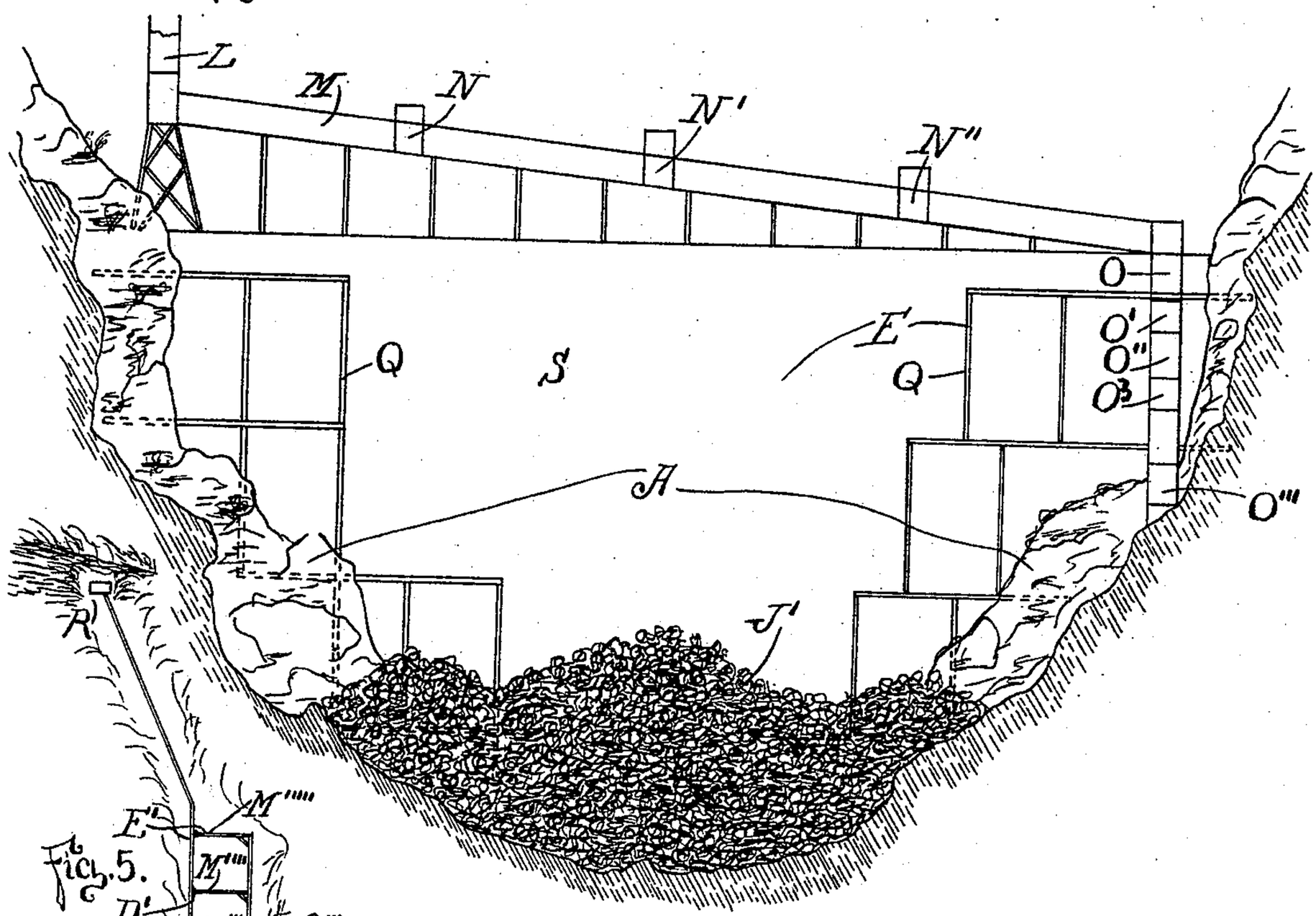

Fig. 5.

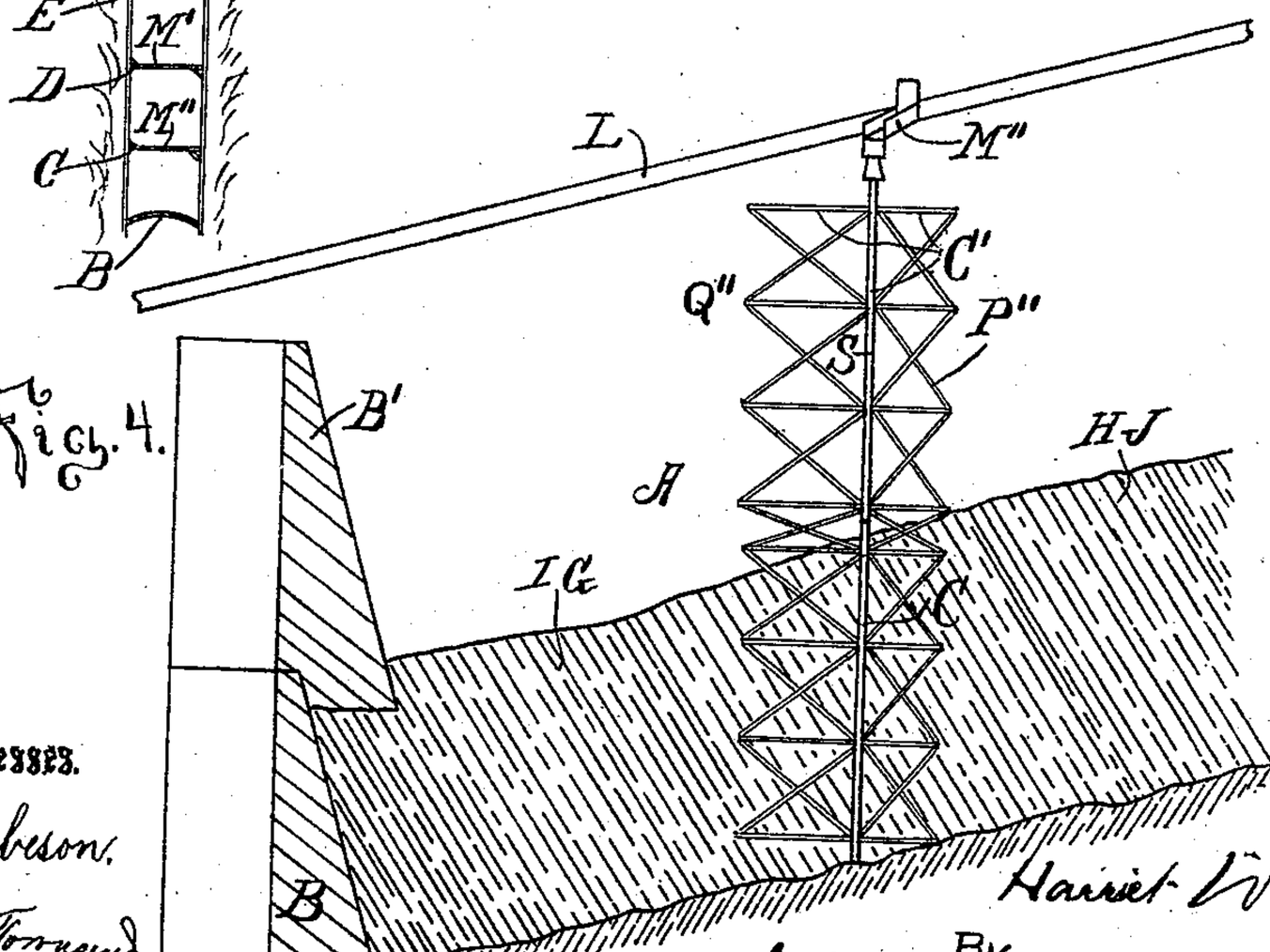

Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

HARRIET W. R. STRONG, OF LOS ANGELES, CALIFORNIA.

METHOD OF AND MEANS FOR IMPOUNDING DÉBRIS AND STORING WATER.

SPECIFICATION forming part of Letters Patent No. 528,823, dated November 6, 1894.

Application filed December 28, 1893. Serial No. 494,934. (No model.)

To all whom it may concern:

Be it known that I, HARRIET W. R. STRONG, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Methods of and Means for Impounding Débris and Storing Water, of which the following is a specification.

The object of my invention is to provide for a convenient, cheap and effectual impounding of débris from hydraulic mines, settling the water and storing the same so as to allow it to be used for irrigation or other purposes.

An ultimate object is to produce at a minimum expense large storage reservoirs in mountain cañons.

The accompanying drawings illustrate my invention.

Figure 1 is a fragmental plan view of a system of works adapted for carrying out my invention. The same illustrates the bottom of a mountain cañon with a series of four dams arranged thereacross to impound the débris and store the water. Fig. 2 is a longitudinal vertical section of the same on line 2—2. Fig. 3 is a section on line 3—3 Figs. 1 and 2, and shows one of the dams in elevation looking from the lower side. Fig. 4 is a sectional fragmental detail indicating the second stage of damming. Fig. 5 is a plan on a smaller scale showing the whole system of works including the mine from which the débris comes.

It is to be understood that the drawings are designed simply to illustrate the general system employed and that I do not limit myself to the exact construction shown, of dams, trusses and sluices: as the same may be changed to meet the exigencies of the occasion or the views of the constructing engineer without departing from the spirit of my invention.

My invention belongs to that class of hydraulic systems illustrated in United States Letters Patent No. 374,378, granted to me December 6, 1887, in which a series of dams is shown arranged across a cañon to form storage reservoirs therein and in which the top of the lower dam is above the level of the bottom of the dam next above.

My invention relates also to hydraulic mining in so far as disposing of the débris is concerned.

My present invention is adapted for the use of less expensive dams than those shown in said patent: and by its use it becomes possible to impound, in mountain cañons at a comparatively small expense the débris from hydraulic mining.

My improved method of impounding débris and providing for the storing of water consists in constructing across the cañon or water course A, the main water and débris retaining dam B, and the series of auxiliary or subsidiary dams C, D, E, &c., the top of each dam being above the level of the base of the dam immediately above it: conducting, by suitable sluices the liquid débris and slickens from the mine, into the reservoirs formed by the several dams in such manner that the débris will be deposited at the bases of the dams respectively and on each side of the auxiliary dams so that the deposits of débris will protect and strengthen the dams and equalize the pressure thereon. The deposit is applied in at least two reservoirs simultaneously so that the auxiliary dam will be simultaneously acted upon on opposite sides by the deposits in the upper and lower reservoir. For illustration: the deposits G and H upon the opposite sides of the dam C are made simultaneously so that the pressure of each deposit is counteracted by the pressure of the other deposit.

The deposit I in the lower reservoir strengthens the lower dam B and the deposits J, K, in the upper reservoirs protect and strengthen the upper dams.

I apply in combination with the series of dams, a system of sluices L, M, M′, M″ which are arranged to discharge the slickens and débris into the several reservoirs formed by the dams. The cross sluices, M, M′, M″, &c., are preferably arranged on top of the supplementary dams C, D, &c., and are provided upon each side with gates N, N′, &c., which allow for the discharge of the débris from one sluice upon the opposite sides of the dam. By this arrangement one flume serves to deposit the débris at the places desired in two reservoirs. This arrangement of the cross flume with relation to the dam saves extra timbering for supporting the flume, the flume being supported by the dam.

O, O′, O″ indicate the location of a series of water outlets or gates through which the

clear water can be drawn off from the top of the contents of the reservoir. Each dam is to be supplied with such gate. These gates may discharge into a pipe located at O'''. No attempt has been made to show such gates in detail owing to the limited scale of the drawings and to the fact that the construction and arrangement of such gates is well known in the arts.

In practice the débris from the mine R is discharged through one or more flumes into two or more reservoirs. The lower reservoir which is formed by the lower heavy masonry dam is allowed to fill until the contents rise above the foundation of the bottom of the dam of the next upper reservoir. The discharge of débris takes place through the sluice from the first auxiliary dam and is deposited at the base of such dam on both sides thereof and a sedimentary deposit of rock, gravel and coarse heavy matter from the débris is formed against the two faces of the dam.

All of the gates, N, N', &c., or only a limited number of them may be opened so that the depositing débris can be controlled so as to produce a deposit at the point or points desired along the base of the dam.

When the lower reservoir is filled, the slickens is shut from it and is turned into the upper reservoirs and the operation is thus repeated on through the series to the uppermost reservoir. The clarified water may be drawn off from the lower reservoir by means of the gates O, O', &c., always drawing the water off through the highest gate the water will flow through, and when the upper reservoirs have been filled and the water drawn off from the lower reservoir, the operation can be repeated as above described.

The upper or auxiliary dams are preferably made of truss supported wood structures. In the drawings P, P', P'', Q, Q', Q'' indicate the trusses which support the dams. The auxiliary dams thus comprise the central partition S, of wood, the truss supports Q, at the sides of the dam at the lower face thereof and the middle truss support P at the upper face of the dam which is arranged with its ends supported by the inner ends of the lateral trusses Q Q.

Suitable anchoring devices T are applied in combination with the trusses to sustain the structure. The anchor cables *t* are attached to the dam at the ends of the trusses. In practical operation the trusses become embedded in the débris and deposits and thus the strength of the structure is increased so that there is practically no danger of the dams being washed away by heavy rain storms.

When the deposit of rocks, gravel and other débris has become sufficient to fill the reservoirs to the top of the dam below, the dam is increased in height by adding a substantially new structure as at B', Fig. 4, of which the deposit and the first masonry dam are the foundation: and the dams may be added to from time to time as the deposits increase thus utilizing the entire cañon from bottom to top; and as the deposits increase, the capacity of the reservoirs is greatly increased because cañons rapidly widen toward the top. By these means a comparatively small amount of stone work will serve to impound a very great quantity of débris and the longer the system is used the greater the available storage capacity of the cañon. Before building the subsequent dams the deposits should be allowed to become perfectly set and solid so that the stone work will not be subjected to settling. When properly constructed the lower retaining dam of masonry, together with the deposit, forms a perfect foundation for the subsequent dams. The deposits form a good water retaining bottom for the reservoir so that ultimately when the hydraulic mines have been exhausted, the remains of said system form water storage reservoirs of great capacity as compared with the reservoirs which it would have been possible to make at the bottom of the cañon when the system was inaugurated.

U is a catch basin at the base of and below the main dam B to prevent injury to the dam by the overflow water in rainy seasons.

Now having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In hydraulic mining the method set forth of impounding débris consisting of constructing in a suitable manner a main dam and a series of auxiliary dams extending across the cañon to form reservoirs with the top of each dam above the level of the base of the dam immediately above it: conducting, by suitable sluices, the débris from the mine into the reservoirs in such a manner that the débris will be deposited at the bases of the dams respectively and on each side of the auxiliary dams.

2. The method set forth of providing reservoirs for the storage of water in mountain cañons consisting in constructing a series of dams across the cañon to form primary reservoirs or basins; running débris thereinto and thereby forming deposits in the bottoms of the basins and thereby forming sedimentary deposits in and filling the same; and then building dams upon the foundation formed by such deposits and dams, and thus ultimately utilizing for water storage purposes, the broad spaces between the upper parts of the sides of the cañon.

3. The system set forth comprising a main dam and series of auxiliary dams arranged across the cañon, the top of each dam being above the level of the base of the dam immediately above it, and sluices adapted and arranged to deposit débris at the bases of the dams.

4. The combination of the dam and the sluices arranged along the top of the dam and

provided with gates adapted and arranged to discharge débris on the opposite sides of the dam.

5. The dams set forth comprising the central partition and lateral truss supports at the sides of the dam at the lower face thereof and a middle truss support at the upper face of the dam.

6. In the storage and impounding system the combination of the trussed dams and means for forming débris deposits so as to embed the trusses.

7. In an impounding system, the combination of the dam and the sluices arranged to discharge débris upon the opposite sides of the dam to form a support therefor.

8. The combination of the partition, the lateral trusses at the lower face thereof, the middle truss at the upper face of the partition and the anchoring devices having their cables attached to the partition at the ends of the middle truss.

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Witnesses:

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