therefore exceed, by $1,180,000, the expenditure required if the present site be retained.

The following is a summary of the definite conclusions arrived at:

(1) That the existing pump house site in the central part of the city is an ideal one from an operative standpoint, as there is ample space for extensions to serve a population of half a million people or more.

(2) That the water supply at this point is not now seriously polluted, but the degree of pollution will undoubtedly increase with the population and may become positively dangerous when the population approaches 150,000.

(3) That a less contaminated supply may be obtained at some point above the city limits at a cost that cannot be considered as prohibitive.

(4) That the distribution system requires immediately many large feeder mains.

(5) That the Roberts filters now installed may be depended upon to filter six millions of gallons daily, the year round, if properly housed and additional clear water reservoirs and sedimentation basin be constructed this year.

(6) That the present station be enlarged to meet the city's demand for water until the new system is operative.

(7) That fire service by direct pressure be abandoned and portable fire engines adopted.

(8) That the waterworks department be consolidated and placed under one executive head.

(9) That about $880,000 should be appropriated for expenditures on the existing plant, including the feeder mains, whether the old pumping station site be retained or not.

(10) That neither the Beaver Hills project nor the Rabbit Hill scheme should be adopted.

THE HARRISBURG FILTER PATENT DECISION.

A COPY has just been received of the decision in the negative head patent case between the New York Continental Jewell Filtration Company, and the City of Harrisburg, Pa., as handed down a few weeks ago in the Middle District of Pennsylvania U.S. Circuit Court.

The case, which has been in the course of trial since the middle of 1908, has attracted wide attention, and the outcome is of extreme importance to the water filtration world, made so by the fact that the down-draft feature is now being used in most rapid sand gravity filtration plants.

Infringement of patents, commonly known as the negative head patents, was claimed by the Company on account of the building and use of the filter plant of the City of Harrisburg, which was erected in 1905, the engineer being Mr. James H. Fuertes, of New York City. It was claimed in this case that the Harrisburg plant was copied in design from the Little Falls plant of the East Jersey Water Company, which plant, according to the evidence, was designed by the complainant Company.

A few points which led up to the decision are as follows:—

The effective filtering agency in slow sand filters of the positive head gravity type is the sediment layer which gradually gathers on top of the sand in the form of an unbroken scum. This layer, a vital factor in filtration, is known as the "Schmutz-Decke." In more rapid, or mechanical, filtration plants, coagulants are used which rapidly form a film that corresponds in function to the "Schmutz-Decke."

As this surface sediment thickens it is so compacted by the head of water pressing upon it that there is little percolation, and further, its compact shell tends to create a vacuum beneath, which, by liberating the air in the passing water, also impedes percolation. In plants of the positive head gravity type of slow sand filtration this "Schmutz-Decke" is substantially the sole place where filtration occurs.

It is in this state of the art of filtration—with the slow formation of the surface sediment layer; with that layer constituting virtually the sole potent factor of filtration; with the sand bed being practically confined to forming the surface sediment shell; with vacuum regarded as a retarder of filtration, and tending to lessen plant output—that the involved patents entered. Mr. Ira Jewell in his process disclosed the radical suggestion that this vacuum, if of such relative completeness as to utilize its efficiency, could be made not only to avoid all troubles incident to air-releasing, but to utilize the whole sand bed as an active filtering agency. In other words, he claimed, by the proper use of vacuum, to convert virtually the whole sand bed into a "Schmutz-Decke."

The practical outcome of his process has been to create in sand filtration a differential type of plant known as the down-draft or negative head filter. It is bottomed on a vacuum, created by design, which results from an off-carrying pipe, vertically arranged and of such length that as the filtered water is carried off by it, a partial vacuum is created within the filter bed. The pipe extends downward a sufficient distance to provide the necessary down-draft, usually several feet. Its action is such that the entire body of filtering material is utilized instead of the upper surface only.

This mere insertion of a water-sealed vertical off-take pipe has added to filtration an important improvement, and the continued use thereof by the defending City of Harrisburg occasioned the charge laid by the Company.

From the evidence and discussion brought to bear upon the case, it was shown that the process really does, by the use of the down-draft sealed vertical outlet pipe, create and maintain an operative vacuum which effects a deeper utilization of the sand body for filtration than is found in positive head filters; that the presence of released air incident to the use of this vacuum is helpful and not harmful by reason of the velocity imparted to the passing water by such a vacuum; that the process makes the runs longer, and that both structural and maintenance costs are lessened by its use.

The court dwelt upon the question as to whether this disclosure involved invention. It was conceded to be an original conception. Further, it was not the mere suggestion of the use of the down-draft tube to create a vacuum. The originality and substance of the disclosure was pronounced to be in the utilization of the vacuum and the apparatus was the concrete means suggested to utilize the process. The disclosure was a marked departure from the previous ideas and practice; it gave to the whole of the large sand body a compacted functional working capacity that it did not previously have; it created a new type of filter in the art, and the process has gone into widespread and extensive use.

On these grounds the disclosure involved invention, according to the decision, and the claim of patent infringement was sustained.