

ON
WATER FOR DRINK,
ITS IMPURITIES PREJUDICIAL TO THE HEALTH
AND
THEIR REMOVING BY DIFFERENT MODES
OF
FILTRATION.

ANNEXED AN ILLUSTRATED CATALOGUE ON
WATER FILTERS

FROM
KUNTZE & C^o, LIMITED,
STOCKHOLM.

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Drop of water, containing animal and vegetable substances, viewed in the microscope.

*This pamphlet with the annexed illustrated catalogue on water filters
will be despatched by Kuntze & Co. in english, french, german or
swedish to any one asking for it.*

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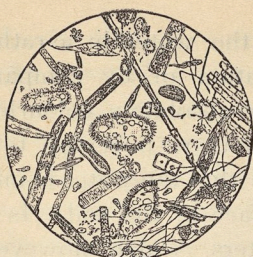
WATER FOR DRINK

FILTRATION

KURTZ & CO. LIMITED



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I.

That in general water not more than air can be procured in too pure a state, will remain an undeniable fact. However medical authorities in as well our own country as abroad have already long ago proved beyond doubt, that pure, clear and good water for drink and cookery contributes undisputably to the obtaining and the preservation of health, while on the other hand the use of bad and polluted water for drink is one of the causes, whereby epidemics are developed.

D:r Griesinger, Privy Medical Counsellor in Berlin, states in his »Manual on infectious diseases» (Malaria, yellow fever, typhus, plague, cholera etc.) many instances proving the propagation of for instance cholera by water enjoyed as drink, and D:r Pettenkoffer, Professor in Munich, has in his treatise on the modes of propagating cholera (*Die Verbreitungsarten der Cholera*) communicated observations tending to prove that there exist pollutions of the water in wells originating from sewers, ditches and cess-pools which are not in the least degree to be detected either by smell or taste, and that likewise such water may be pure and clear to the eye and yet very dangerous. In Leipzick, Breslau etc. most wells were closed by the police authorities during the cholera epidemic of 1873 and at the same time river water was prescribed by the medical authorities for drink.

But not alone cholera but also the development of typhus, diphtery and dysentery etc. is considered to be principally due to the drinking of a bad and polluted water.

Professor Cleve states in his treatise: *How ought a judgement to be formed about the good quality of water for drink? An inquiry with particular reference to the water supplied by the Stockholm Water Work*: »The colour of the water is easily ascer-

tained by examining the water in a rather thick layer against a pure, white substratum or by comparing it with an equal quantity of distilled or absolutely colourless water. If the water be colourless and clear there is reason to infer, that it is good. A turbid state implies that the water is mixed up with impurities deriving from the surface of the soil. Is the water yellowish it contains organic matters, which however do not always constitute positive proofs of the bad quality of the water, but will simply imply that it *may* be bad. Organic matters *may be* inoffensive, but on the other hand there is reason to apprehend in water, rich of organic matters, the presence of those small organisms, which the cause of infectious diseases or epidemics is attributed to.» Mr John Simon, member of the »River Pollution Commission» nominated by the English Government, says with reason: »that chemical analyses are not always apt to determine the properties of a water unhealthy for drink. A water may be very fit for propagating cholera and yet present a satisfactory result in a chemical point of view.

Mr Amedée David says in his treatise: *On the filtration of river water*, »that organisms in their smallest forms as well as animal putrefactive matters — the latter of any origin soever — constitute an ingredient injurious to the health particularly in the water for drink and that it has been established almost to a certainty that the cholera plague in India must be attributable to the great affluence of pilgrims at the Ganges, considering that the pilgrims are drinking this water and by their continued bathing therein still more increase the pollution of this river containing so many matters in suspension. That in numberless insulated cases the cause of sudden fits of malady must be attributed to drinking polluted water is sure. Observations carried out at a great scale in London during the different cholera epidemics in that metropolis have presented statistical proofs to the effect that the quarters supplied with bad water have suffered most from the plague and, besides, more detailed observations extended in this case to single houses and persons have given the same result.

Professor Heiman in his discourse read before the Association of Sanity administration of Stockholm on the 25 october 1884 says amongst others: »Which are then the local conditions which favour the propagation of cholera as far as we are aware from

previous epidemics? In the first place organic matters in course of decomposition in the ground under our dwellings, in the water we drink and in the air we inhale.»

It is thus not only from the point of view of cleanliness but also in order to maintain the health and to prevent the spreading of contagious diseases generally advisable to cause all water intended for drink to be carefully purified before enjoying it.

What particularly concerns the water supplied by the Stockholm Water Work we agree with Professor Ekman: »The water in Årstaviken and the water supplied by the Stockholm Water Work 1874»; that the same cannot be termed bad, provided always that no greater claims are made upon it than may reasonably be made upon only sandfiltered lake water such as may be found in the vicinity of Stockholm, sharing Professor Ekman Professor Hamberg's opinion that the water supplied by the Stockholm Water Work may be considerably improved by a subsequent filtration by means of charcoal filters.

II.

There exists, as well known, no chemically pure water in nature. Every water contains partly through the contact with the atmosphere absorbed, partly from passed layers of earth originating earthen and gaseous matters, which are partly dissolved and partly undissolved.

The water fit for the want of towns is of three kinds:

- 1:0. Water oozing out from the depths of the earth and raised in an artificial manner to its surface, viz. artesian and natural wells.
- 2:0. Springs, arising through atmospheric downpourings, which generally must in a very deponsive way be conducted to the towns; and
- 3:0. The natural neighbours of towns, rivers and lakes.

Water in wells is to be considered as a product of the natural filtration, although in a somewhat greater depth, wherefore the use thereof for drink, particularly near cess-pools etc., is not advisable in sanitary respect, even though the water appear most clear to the eye. The wells are besides in relation

with the atmospheric air, wherefore the water develops in itself small animal and vegetable organisms. The conduction of spring water is combined with enormous costs.

The new project of supplying London with spring water is according to different calculations computed to cost from 282 millions to 314 millions of francs. The difficulty of this water supply consists however in the great uncertainty of production, which is rather increasing than decreasing, as the case is said to be in Vienna, where already another water supply has been thought of according to report.

Abundance of water is the first postulate for human industry and industrial development deriving therefrom. This supply must at places, where many people are cohabiting, as in great cities, be unlimited and thus also out of sanitary reasons be sufficient for an increasing population. For the water supply to great cities an inexhaustible source must therefore be chosen as depository, a source which only rivers and lakes can offer.

Formed by atmospheric moisture the composition of the water in rivers is very different according as it, during different seasons, is exposed to atmospheric influences. Its passage through different geological formations, from which it both chemically and mechanically brings along particles, is the cause of not alone the quality of the water itself but also of the quantity of undissolvable matters suspended therein, owing to the different solubility of these formations and to the mechanical influence of more or less great fall. Owing to the law of gravity the flowing water carries along earthen particles, which through the force of the water have been separated from the bottom of the river bed deposit, pebbles, gravel and sand, while the finer particles become suspended in the mass of water.

The number of such particles suspended in the water is very different. Thus for instance the Ganges brings to the ocean annually more than 43,063,000,000 kilogrammes of solid particles; the Mississippi contains in every cubic mètre of water 803 grammes; the Nile at Cairo, 580 and the Yellow River in China only 5 grammes of solid matters.

The particles suspended in the water are often very difficult of separating. Thus the water of the Rhine at Bonn did not become clear until it had been left at rest during 4 months.

How different the mass of suspended particles was at different

times results therefrom, that for instance the Rhine at Bonn contained, at an overflow in the year 1851, 205 grammes solid substances by each litre of water, while in the year 1852 during a strong drought it did not contain more than 17 grammes. The Danube carries away annually more than 60 millions cubic mètres of solid matters; the Loire contains 225—250 grammes per cubic mètre; the Seine up to 5 kilogrammes per cubic mètre and Mr Arago has established, that every person consuming daily 1 litre of Seine water consumes simultaneously $1\frac{1}{2}$ gramme earthen particles suspended therein. An augmentation of the substances suspended in the water takes further place there, where the low tide partly brings back a great part of matters brought with by the rising flood and partly receives the sewer outlets of great towns, which outlets frequently are situated at such points that they must be conducted into the river. How great the difference may be in this respect is shown by Mr B. A. Thomsen's analyses made in the Thames:

At Vauxhall the difference was	3.87—14.62
» Hungerford	6.98—16.12
» London Bridge	4.85—16.17

The numerous determinations carried out by the Professor Almén, General-Director of the Board of Health, prove that good waters for drink contain a less total quantity of dissolved matters than bad ones. For potable well water Mr Almén states an average of 59.2 parts of solid matters on 100,000 parts of water but he admits that the rate can amount to 142.

Mr A. David says: the first condition for the population of a great town at the enjoying of the existing water is its clearness and purity obtained by the greatest possible removing of matters suspended therein, organic or inorganic, and which can be effected by means of filtration.

III.

Artificial filtrations at a great rate are generally effected at the water works of great towns and consist usually therein that the polluted water is caused to pass through more or less dense layers of sand and gravel. In order that the sand may

not follow the water to be filtered, strainers are disposed, the pores of which are finer than the single sand grains. Different systems are employed for the purpose. The system employed in London, where the above method of filtration is preferably used, consists therein, that either bows with lateral openings are disposed or canals constructed of big stones, into which water can penetrate without difficulty, or also small vertical walls have been erected, on which loose stone slabs are placed. On these substrata pebbles or shells of such size have been spread that they are unable to penetrate into the interstices of the collecting canals. Hereupon a new layer of smaller stones or finer gravel is spread, whereupon a still finer layer of gravel is arranged and lastly upon this the filtering material itself, or sand in varying thickness. To be able a priori to determine the filtration capacity of a sand layer is up to this day an undissolved problem, as the nature of one and the same water source incessantly varies and the filtering pores will be stopped up by the matters suspended in the water. During the summer the water of for instance the Seine is considerably clearer than in winter but nevertheless it requires then a more vigorous purification owing to the circumstance, that a slimy mass closes the pores of the purifying agent and thus in an essential degree reduces the filtration power.

What now respects the quality of the water produced by the above mode of filtration, it is by no means superior to that obtained by natural filtration. In London, where only sand filtered water is supplied to the consuming public, there is scarcely a single house where not the water intended for domestic purposes, say to drink, cookery etc. does not previously undergo a renewed filtration by means of smaller so called domestic filters of different construction. This is also the case at many other places and particularly at Marseille, where the sand filtered water from the Durance is more impure than many unfiltered river water and that notwithstanding a rather great filtering basin giving the water contained therein a due rest for depositing strange matters.

It is impossible to deny that in the deeper and looser layers of sand filters impure deposits at a great scale take place and which deposits accompany the filtered water and by and by fill more or less the net of the street pipes, spread in a town.

As little any one is likely to deny that in general these deposits contain vegetable substances fit for nourishment to animal organisms, which latter are of nature not to be disturbed in their capacity of development by the filtrated water adducted. Of this allegation there is a proof from Altona, the water of which, however clear to the eye, very soon developes a not inconsiderable vegetation of algae, as shown by a specimen taken 1872, which still is to be seen at the municipal chancery of the said town. That the water conducting pipes not only in the above case can pollute the filtered water is proved, what regards London, by the report from the River Pollution Commission, calling attention to the mode of joining the water conducting pipes and the commission condemned particularly the mode of surrounding the pipes at the joints with hemp and soldering with lead. The remarks of the Commission in this respect run thus:

»The junction of the water conducting pipes by means of hemp and soldering with lead causes in a long net of pipes, by the contact of the water with hemp or similar matters, the development of organic matters existing in the water, whereby the latter becomes disagreeable to eye and taste. Irrespective of this inconvenience there will arise in those places surrounded with hemp breeding nests for new broods of animal matters, so that the depravation of the water by means of pipes joined in this way was during 2 years very great and has continued so for many years.»

A further communication of the same Commission gives to understand that water conducting pipes, which already 20 years ago were surrounded in the joints with tared yarn, still, after a so long lapse of time, has exercised a prejudicial influence on the water through the increase of organic matters. Mr A. David says speaking of the water supply of Hamburg, which water equally to that of S:t Petersburg is not subjected to sand filtration, but conducted to the consumers unfiltered: »that masses of impurities and numberless algæ and living animalcules and animals, the latter up to rather big fishes, fill the water conducts and that said fishes very frequently occasion damages and obstruction of the water conducting pipes within the houses. Respecting Toulouse Mr A. David says that in its filtered water supply a rich algae vegetation had developed itself and that several amphibia had there established their wrestling place, for

the preventing of which a complete rebuilding of the filtration galleries was undertaken. Further Mr David states respecting Toulouse that at the exhibitions of 1867 and 1871 fishes had without any further supply of food lived and thrived in an aquarium supplied with filtered water from the water conduct of the town.

IV.

The insufficiency of the filtration of water at a great rate, which takes place at the respective waterworks of the towns, has everywhere, where a great water consumption exists, as in England, France, Germany etc. had for result, that the water thus filtered has been subjected to a further and more vigorous purification at home by means of smaller purifying apparatuses, or so called domestic filters of more or less efficient systems. Particularly in England there is not a single place with river water supply, where the water is not first subjected to a sand filtration and where not at the same time the necessity of a subsequent filtration at home has been acknowledged. This proves on its part how insufficient the first purification, or the filtration at a great rate, is there considered to be.

The above mentioned »River Pollution Commission» appointed by the English Government says respecting the filtration at home amongst others, »that this filtration, performed in a just way, is more than the sand filtration at the water works able to improve a water polluted by organic matters.» Mr H. M. Witt has with the water of the Thames made comparative trials on the filtration by means of sand and charcoal, of which resulted that charcoal removed from the water, of organic matters 17 times and of unorganic matters 140 times more than sand.

These trials prove likewise that coal not only in a higher degree than sand is able to retain organic substances but that it also has a much more rapid effect.

Besides Mr H. M. Witt's above mentioned comparative trials of filtration by means of sand and coal, proving that of organic and inorganic matters conjointly charcoal is capable of removing 27 times more than sand, Mr Arthur H. Hassel

has likewise undertaken investigations of the filtration capacity of different bodies and has found that sand, filtering paper (cellulosa) and even pulverized sand-stone as filtering material do not possess the capacity of retaining infusoria, while charcoal permits only the smallest ones to penetrate its mass and animal coal (bone black) completely retains infusoria.

According to analyses made in the year 1874 by the professors Hamberg and Ekman of Stockholm on the water from Årstaviken and the Stockholm Water Work, it results likewise: that coal-filtration had a great capacity respecting the removing of organic matters from water and their mutual opinion, particularly respecting the Stockholm water supply, is, that this water can by means of coal filters be purified, so that the quantity of organic matters be reduced more than half.»

Extract from a report of professor Frankland to the »General Recorder of The Royal College of Chemistry» dated the 4 August 1866. »In my last quarterly report to you on the metropolitan waters I have showed that filtration by means of bone black has practically removed all organic matters from the New River water. Through manifold further investigations I have been convinced that such a filtration is equally effective on impure water from pools and ditches. Bone black alone has this capacity — — —.»

At last it may be added that the Commission appointed at its time by the Senate of Hamburg with the view of studying, under travels in Germany, France and England, the water supply and filtrations of the greater towns, imparted in their report after their return such communications as to prove that the water filtration by means of coal was acknowledged as the best for common domestic purposes.

The patented filters of Kuntze & Co., limited, have since the year 1875, say during these 10 years, undergone considerable improvements which results from the extract of testimonials beneath, imparted at different occasions by the most eminent men of science and professionals as well in our own country as abroad of the analyses performed.

1:0. *Mr F. L. Ekman, professor at the Royal Polytechnical Institution*, says amongst others in his testimonial of the 7 March 1876.

Water can by means of the filters made at the manufactory of Kuntze & Co., limited, be purified of as well particles in suspension, which make it turbid, as of a great part of the substances not visible and dissolved therein.

They warrant against the pollution of the water by rust or other deposits, which from time to time may scale off from the water conducts, or by the fine matters in suspension which occasionally may get through the sand filters.

What further regards the matters dissolved in the water and not visible to the eye, the coal filters remove a great part of the lime, which makes the water hard, and likewise of the organic matters, which to all common river and lake water as well as to the water of many wells impart amongst other inconveniences a colour strange to the water.

The effect of the filters, of which it is more particularly the question here, say coal filters to be combined with the water conduct, has, with the view of ascertaining their capacity of removing matters in suspension, been tried by me on the water supplied by the Stockholm water work, beeing a soft, carefully sandfiltered lake water. At a filtering velocity of 2.62 litres per 5 minutes the filter removed 33 % of the hardness of the water, 43 % of the organic matters suspended therein and 75 % of the colour of the water, the latter as compared with mixtures of undistilled water and the unfiltered water of the water supply.

A remarkable and very agreeable improvement the water

of the water conduct obtains by the filtration particularly therein that the yellowish colour of the lake water, which in a thicker layer, for instance in a bottle, very distinctly manifests itself, is thereby removed, so that the appearance of the filtered water resembles that of spring water.

The filters in question are besides carefully constructed, easy of application to the water conduct and require little space.

Their purifying power is, as results of the above, very considerable.»

Mr. Aug. Almén, professor and general director of the Board of Health, says amongst others, in his testimonial of the 31 December 1881.

»At the request of Kuntze & Co., limited, of Stockholm, I have, with the view of ascertaining the purifying capacity of the said Company's patented coal filters, tried 4 different water samples from Malmö and concerning the results obtained, I have pleasure in stating the following:

At the filtration by means of the Kuntze & Co., limited, coal filters all the suspended and mechanical impurities have been removed, by far better than sand filters are able to do, and so completely that the water purified in this manner seemed to be as clear as the best spring water. This filtration has removed not only all mechanical impurities but also a great many of the dissolved and colouring organic matters.

The consumption of oxygen at the said trial was pr 100,000.

a) Unfiltered Malmö water	1.47
b) Sandfiltered »	1.26
c) Water filtered through Kuntzes filters	0.86
d) » » » » »	0.85.»

Extract from a certificate of Mr C. Ekendahl, chemist at the Stockholm water supply, on comparative trials for ascertaining the effect of the Kuntze & Co.'s filters and those patented in this country by another firm:

»At the request of Kuntze & Co., limited, the undersigned has made a trial of waterfilters partly from the said Company and partly from another firm, which have obtained a patent in

this country on water filters, and respecting the capacity of those filters of purifying the water supplied by the water work of this place I state the following:

For these trials — at which besides an other professional man assisted as witness — one filter of each manufactory was used, mounted one at the side of another at the same water conduct and above the same outlet pipe. By this disposition there was a guarantee that quite the same water were under equal pressure conducted to the both filters.

First the quantity of filtered water, which each of the both filters was able to produce in a minute, was exactly determined, which quantity turned out to be at full velocity for

the filter of Kuntze & Co. 7.02 litres

» » the other firm 3.38 »

There beeing reason to suppose that the filtering effect depended upon the speed, so that it decreased at a greater velocity, there was also taken samples of each filter after the velocity of the issuing current had considerably decreased by tightening the cocks. The measured velocities were in this case for the filters of

Kuntze & Co.'s pr minute 0.50 litres

The other firm » » 0.39 »

With the 4 samples thus obtained a colometric trial was first made, at which at the same time, by way of comparison, distilled water and water from the water conduct were employed. The 6 water samples formed, viewed in a layer of 15 centimetres depth against a white substratum, an irregular scale of colours from white to yellow in the following order:

Distilled water:

Water filtered through the filter of Kuntze & Co. 0.50 litres a minute

»	»	»	»	»	»	»	7.02	»	»	full speed
»	»	»	»	»	»	the other firm	0.39	»	»	
»	»	»	»	»	»	»	3.38	»	»	

Water from the water supply. . .

The both water samples differed in colour very little one from another.

The better sample of Kuntze & Co.'s filter was much superior to all the preceding ones. It was almost entirely colourless and differed but very little from the distilled water placed beside.

At the trial made next, at which the consumption of oxygen was determined after the same method which was used by me during 1882 and in the current year at the analyses carried out at the Stockholm waterwork, the following figures were obtained with the filters of:

Kuntze & Co.'s (velocity 0,50 litres a minute)	consumption of oxygen	1.31	a million
" (" 7,02 " ")	"	"	1.93 "
The other firm (" 0,39 " ")	"	"	2.71 "
" (" 3,38 " ")	"	"	2.66 "

The water supply: Consumption of oxygen 2.77 a million.

Computed in per cent the filters had thus proved to possess an effective purifying power, as far as this may be judged from the consumption of oxygen of:

Kuntze & Co. (0,50 litres a minute)	52.71	%
" (7.02 " ")	30.33	"
The other firm (0,39 " ")	2.19	"
" (3,38 " ")	3.25	"

What regards the consumption of oxygen — the conventional measure of the organic matters contained — the water filtered through the filters of the other firm differed thus very little from that of the water supply — it seemed even that the filter used at the trial had already attained the point, where it commences to return to the water substances, which it during a previous period had retired therefrom. At all events the effect of the filtrum of this firm was remarkably small — or in chemical respect almost none.

In consequence hereof I bought personally a new filter block of the make of the other firm, by which I undertook new trials. This block was much more compact than the former, for the greatest velocity of the issuing current was now only 1,34 litres a minute. Notwithstanding the consumption of oxygen proved even now to be remarkably high. At two trials respectively 2.41—2.44 per million were obtained. The average hereof 2.42 constitutes, if the water from the water conduct be still calculated at 2.77 as before, a purifying effect of 12.64 per cent, or if the water of the water conduct is estimated at 2.82 which rate of consumption of oxygen it had at the day when the trial was made — of 14.19 per cent.

After the water had uninterruptedly flowed during 17 hours a sample retired showed:

Consumption of oxygen 2.83

» » 2.79

Average 2.81

After about 1300 litres of water had thus in a continual current passed through the filter, the latter had lost even the last trace of its filtering power and in this circumstance it seems to me that a good explication may be found of the remarkably small effect which the filtrum of the other firm had showed at the previous trial.

In consequence of the above I declare that the filters of Kuntze & Co., owing as well to the greater quantity of water they are able to deliver, as particularly to their greater purifying capacity, are in a high degree superior to the filters of the other firm.

Stockholm, October 20, 1883.

C. Ekendahl,
Chemist.

Amongst the many testimonials we possess from eminent foreign men of science on our patented filters we cite the following ones:

From V. Stein's Chemical Laboratory, Copenhagen.

» Trials by filtration of very impure water by means of Kuntze & Co.'s filter at the water pressure of Copenhagen.

The investigation referred to the most important points of view and the result thereof was as follows:

Grammes in 10,000 grammes	Impure water	Filteted through Kuntze & Co.'s filter 1 liter per 1 1/2 minute
	Grammes	Grammes
Solid residuum 130 °C....	10.260	8.720
Ammonia	0.005	0.045
Nitric acid	1.198	1.034
Nitrous acid.....	0.—	traces
Muriatic acid	1.560	1.560
Consumption of oxygen...	0.079	0.015
External Conditions	{ yellowish, not clear, bad smelling	{ colourless, quite clear, odourless
Microscopical investigation	{ Numerous bacteria, mi- crocoes and infusories	No organisms

This investigation has thus proved that the filter has completely delivered the water from the organisms present, that it has removed the strong yellow colour and retained the matters in suspension. Particularly the considerable decrease in the consumption of oxygen merits every consideration.

Copenhagen, March 19, 1883.

V. Stein.

From Mr. C. Nebelong, Professor, Copenhagen.

After having had the occasion of more than a year to follow in my dwelling the effects of Kuntze & Co.'s domestic filters, I have great pleasure in certifying that they have proved excellent filters in every respect.

Our water, which always is of a yellowish colour and contains organic matters, though in a comparatively small degree, becomes quite colourless and obtains a quite pure and agreeable taste after having passed the filtering apparatus.

The filtering apparatuses have worked constantly during the whole year and the result is in this moment quite as satisfactory as it was in the first days after their application, and this opinion is based upon my personal experience, wherefore I have every reason to recommend these filters in vast circles for the pleasure of the concerned.

Copenhagen, June 1884.

Yours respectfully

C. Nebelong,

Professor, Physician in ordinary to his
Majesty the King of Denmark.

From Mr. Michael Ballo, Chemist in chief of Buda-Pesth (the capital of Hungary) the 11 June 1884.

After having examined the Kuntze domestic filters, which already since many weeks are in use at different points within Buda-Pesth to the great satisfaction of the landlords, I have been convinced, that the same are able completely to remove from our water supply all the matters in suspension therein and partially to deliver it from dissolved organic matters contained in the water.

The decrease in the quantity of organic matters has proved

comparatively greater, the more unclean the unfiltered water has been, and, at an average, 44.08 percent, say about the half of the organic matters contained in the unfiltered water had dissappeared after the filtration. At a suitable treatment the water obtained by the Kuntze filtering apparatuses becomes quite pure and only in the most unfavorable cases feebly opalized. In consequence of the experience thus acquired I can give these filters a very warm recommendation.

As will be perceived from the above testimonials our filtering apparatuses have attained results, which not even any competing manufacture at the universal exhibitions has been able to surpass, a fact which is also proved by the many prizes which have been awarded to us abroad and amongst which we, as particularly distinctive, mention the following:

The prize at the hygienical Congress of Brussels and the gold medal at the universal exhibition of Amsterdam 1883, the *sole* highest prize awarded there to the many competing exhibitors of filters from all parts of the world.

Our filters have in these last years been introduced in the most European countries as well as in America, Africa etc. particularly as our filters not only by their purifying power but also owing to their cheap price have been able to sustain any foreign competition.

Notwithstanding the successes with our filters have already enjoyed as well in this country as abroad, we have however not desisted from our exertions still more to improve our manufacture and to this the investigations of bacteries carried on in the last time have advised us strongly.

Hitherto vain efforts have been made abroad to produce a filter so qualified as to remove micro-organisms (bacteries and infusories) at the same time as it alienated organic matters from the water.

The success has in general only been partial in as much as some single manufacturers of filters have succeeded in diminishing the consumption of oxygen with a few percent without being able however at the same time to remove the bacteries — while other manufacturers have on the contrary succeeded in removing the bacteries without being able at the same time to alienate the organic matters dissolved in the water and likewise the colour, odour and taste.

With the kind assistance of swedish and foreign men of science together with uninterrupted experiments carried on during a long time and at great costs connected therewith, we have at last succeeded to produce an improved filtering apparatus, which not only rids the water of bacteries but also at the same time reduces the quantity of organic matters from the formerly almost insurmountable 50 % to the high figure of 80 percent, or in a word the removing of *all* the prejudicial ingredients in the water, in as much as it has proved that the residuum has consisted only of crenic acid and spring deposit acid, necessary ingredients of a good water for drink.

We have thereby attained a height insurmountable by any filter hitherto invented.

It should be particularly observed that the microscopical investigations of our improved filters performed in the last time by men of science have not taken place in the old manner very little to be relied upon but in the most modern one by means of trials of cultivation on the nutritive gelatin recommended by Professor Koch.

We insert now beneath some of the testimonials imparted in consequence of the last scientific investigations of our recently improved filters, viz.

» Testimonial of Mr. C. E. Bergstrand, Agricultural Chemist.

At the request of Kuntze & Co., limited, of Stockholm, the undersigned has since the month of December last year executed a great many of investigations on water, the principal object of which has been to determine the so called consumption of oxygen of the water obtained by the use of the improved filters which the said Company has been able to produce in the last time.

As result of these investigations I have to state, that whereas the Stockholm water supply has at repeated trials in the said time shown a consumption of oxygen of 0.56 at an average, Kuntze & Co. have by successive improvements in the manufacture succeeded to arrive so far that the consumption of oxygen of the same water after the filtration through these filters has been reduced to 0.11, thus a decrease of 80.35 percent of the previous content of organic matters, and this filtered water has besides what regards colour, smell and taste proved to satisfy any claim on a good and pure water for drink.

In consequence of special investigations for ascertaining the nature of the organic matters, which might remain in the filtered water, these rests seem only to be traces of crenic acid and spring deposit acid, while no ingredients prejudicial to the health could be detected not even those of the form of bacteriæ or other such organisms, which have been detected in the common water supply, but not in the water purified through the filters of Kuntze & Co. according to what trials of cultivation carried on at the same time have proved and of which a particular certificate has been imparted by an expert person (Dr. N. Wille, Amanuensis at the botanical section of the Royal Museum of Natural History).

Stockholm, March 28, 1885.

C. E. Bergstrand,

Professor.

Testimonial of Doctor N. Wille, Amanuensis at the botanical section of the Royal Museum of Natural History.

Trials made with several filters of Kuntze & Co., limited, have shown that a sample of water containing bacteriæ which had passed through a Kuntze & Co.'s filter of the construction No. 3 was completely delivered from bacteriæ, which was ascertained by trials of cultivation made upon the nutritive gelatin recommended by Dr. R. Koch of Berlin.

Stockholm, March 27, 1885.

N. Wille,

Amanuensis at the botanical section of the
Royal Museum of Natural History.

At the above investigations the undersigned has been present and partaken therein.

C. E. Bergstrand,

Professor.

Chamberland's filter (système Pasteur) in relation to Kuntze & Co.'s anti-bacteric filter.

By Dr. Pasteur's in Paris and Dr. Koch's in Berlin scientific researches in the bacteriology it has been proved that removing of bacteria and other micro-organisms from a water polluted therewith, is hardly to be completely effected by means of filtering apparatuses of the systems hitherto in use. While former systems of filters have been based upon the principle of purifying the water principally in a *chemical* way, Mr Pasteur proves that it is not by a *chemical* but by a *physical* action, that the smallest infusories may be removed. That is to say in another words, that the water must pass through a filtering agent made so dense, that it cannot be penetrated by micro-organisms, which on the contrary remain on the surface of the filtering agent, from where they may be easily washed off.

Mr Chamberland, assistant in Mr Pasteur's laboratory in Paris, has invented a filtering apparatus apt to remove micro-organisms from water in a physiological way. The apparatus is so disposed, that the water passes through a porous clay cylinder enclosed in a metallic case. The principle is in itself quite correct, but it has however proved, after scientific investigation, to offer great difficulties in obtaining uniformity in the porosity at the manufacturing (burning) of Chamberland's clay cylinders, so that a filter differs widely from another. These clay cylinders are besides, owing to their thin walls, very fragil to transport, and still more to handle and receive thus very easily greater or smaller cracks in the material. The junction of the clay cylinders to the metal by means of enamel offers also difficulties as to absolute impermeability. The consequence of these circumstances

has also at scientific investigations of water filtered through Chamberland's filters of different degrees of porosity proved to be such, that only the most compact clay cylinders have been able to retain micro-organisms, while defective or less compact ones have let through both bacteries and infusories.

Owing to the great fragility of these clay cylinders, their use in daily life offers besides great inconveniences. For not to mention the costs for substituting new cylinders and their junction by means of enamel, just this very junction in a manner absolutely waterproof is an essential condition, without which the apparatus is worthless. Lastly must not be omitted the disagreeableness to the buyer of not being able, under the said circumstances, to control himself, whether his apparatus is effective or not, as the microbes are not visible to the naked eye.

But even supposed that a Chamberland's filter could be found, the clay cylinder of which had the requisite density for retaining microbes, this apparatus possesses however but a little capacity of reducing the consumption of oxygen of a bad water, that is removing organic matters. Nor is Chamberland's filter able to deprive a bad water of its colour, smell or bad taste. It proves, on the contrary, that water having passed through Chamberland's filter communicates to the water thus purified a bad taste owing to the clay, of which the cylinder is made.

Chamberland's filter will scarcely attain any greater importance in practical use, even thereby that it supplies a too insignificant quantity of water. An apparatus with a less porous cylinder emits the water only in rare drops. It may then be easily imagined, how long a time would be necessary for obtaining on only glass of water.

It is certainly observed by the inventor, that this inconvenience may be removed by combining several filters abreast. That is certainly very true, but in this case the costs must not be considered.

In order to obtain the same quantity of purified water by Chamberland's filter, as may be obtained by Kuntze & Co's recently invented antibacteric apparatus, 6 Chamberlands filters would at least be requisite, costing each 27 Crowns, say together 162 Crowns, while Kuntze & Co's filter of the size affording the same quantity of water as 6 Chamberland's filters costs complete only 30 Crowns.

Mr Chamberland's system for removing microbes from water is based on entirely physiologic grounds exclusive of chemical ones, unless the same water has not previously passed through another apparatus with chemically acting properties, which Mr Chamberland also advises to do in his petition for patent.

Kuntze & Co's new anti-bacteric apparatus for water conducts, which to its volume is many times bigger than Chamberland's filter, is the only water filter hitherto known, which combines the capacity of absolutely purifying water in a *chemical* as well as *physical* way. Chemically it deprives water of organic substances and matters in suspension and physically it removes bacteria and infusories.

The purifying agents employed by Kuntze & Co in their water filters have all intrinsically the capacity of purifying the water in a chemical way. The physical effect is produced thereby that plastic porous coal blocks are treated with silicate of alumina according to a patented method. By this treatment the blocks obtain a reduced porosity equal to that of Chamberland's most compact clay cylinders, so that thereby they perfectly retain bacteria and infusories. But contrary to Chamberland's cylinders, Kuntze & Co's blocks will always prove uniform as to the porosity, as the blocks are constantly saturated with the hydrates serving to produce silicates of alumina and are then dried by only hot air, so that any irregularity in the make cannot occur as in the burning of clay cylinders. Besides the coal blocks treated in this manner obtain an increased force and durability without substituting new agents.

These filters can however, as is also the case with Chamberland's filters, be employed only in combination with water conducts or, in general, at places where a strong pressure is to be procured.

For a low pressure on the contrary Kuntze & Co have constructed another filters, but with similar effect. The chemical action is effected by all the purifying agents used for the purpose and the physical effect is produced by the pulverized carburet treated with silicate of alumina and having the capacity of duly tightening the pores of the asbestos cloth, likewise treated with silicate of alumina, surrounding the recipient, so that the microbes are prevented from passing through the purifying recipient, but are collecting on the surface (see further page 27).

Another important advantage is offered by Kuntze & Co's filters partly thereby, that they can be cleansed with great facility and simplicity by whomsoever and partly by the very low cost of maintenance compared with that of other filters.

Kuntze & Co have taken out patents on their new system of filtration in all European countries as well as in America.

PRICE-CURRENT

FROM

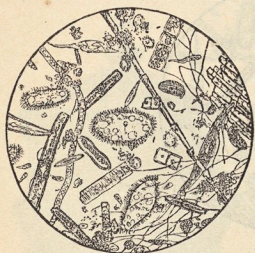
KUNTZE & CO, LIMITED

ON

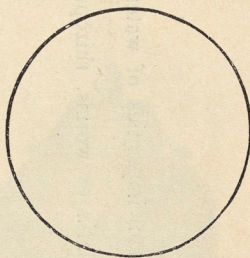
PATENTED WATER FILTERS

Prizes awarded at the following exhibitions:

<i>Hygienic Congress at Brussels</i>	of 1876.
<i>Universal Exhibition at Philadelphia</i>	» 1876.
<i>Horticultural Show at Hamburg</i>	» 1877.
<i>Diploma of the Académie Nationale of Paris</i>	» 1877.
<i>Universal Exhibition at Paris</i>	» 1878.
<i>Universal Exhibition at London</i>	» 1884.
<i>International Exhibition at Blidah (Algeria) gold medal for collective show</i>	» 1884.
<i>Universal Exhibition at Amsterdam (sole gold medal awarded for water filters)</i>	» 1883.



Drop of water containing bacteries, infusories and vegetable substances seen in the microscope.

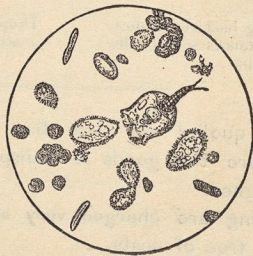


Drop of the same water seen in the microscope after filtration by Kuntze & Cos water filters.

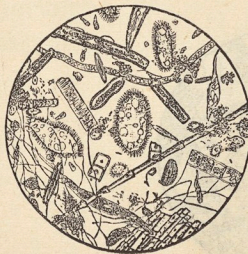
The prices are quoted net cash free on board ship or on railway at Stockholm, from where the goods is transported for the account and upon the peril of the consignee.

Cases for packing are charged very cheap and will be retaken at the half price if returned free of costs.

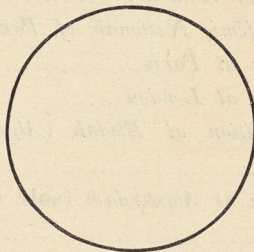
The most common impurities of water consists of: bacteries, zooglæa, microgens, vibrations, monades, fungi and oscillariæ, entozoa, filaria or worms, rhizopoda, englenæ, algæ and diatomæa, hydrozoa and entosnostræa.



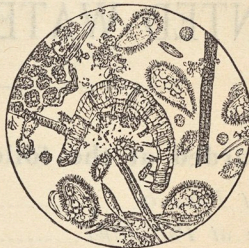
Animalculæ.



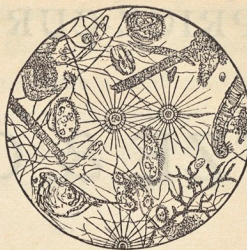
Animal and vegetable impurities.



Water filtered through the filters of Kuntze & Co.



Organic substances (living and dead).

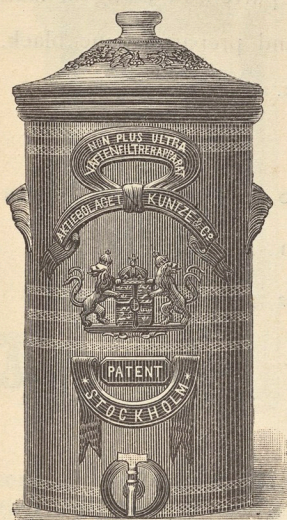


Animal and vegetable substances.

Portable filters of stone-ware.

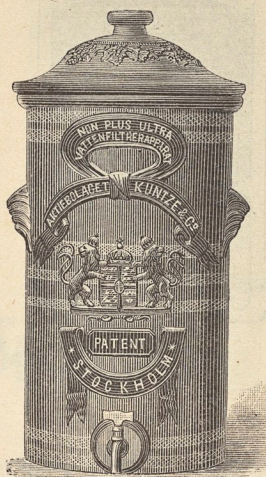
Size

N:o 2



25 litres

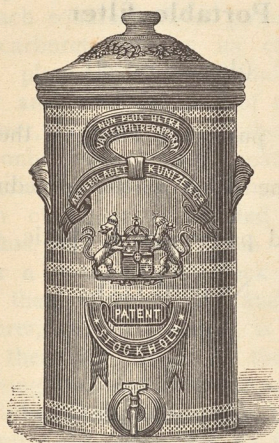
N:o 1



15 litres

Capacity about

N:o 0

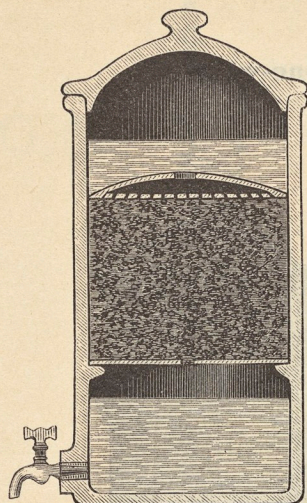


N:o 0



Capacity about 8 litres

A

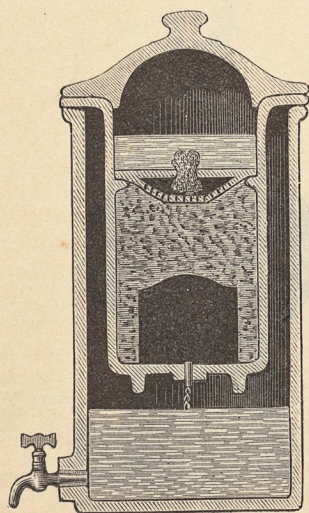


Portable filter

containing pulverized filling of manyfoldly calcined and prepared bone black. Nickeled cock.

Size N:o	0	price each	Crowns	15.—
»	1	»	»	18.—
»	2	»	»	25.—

B



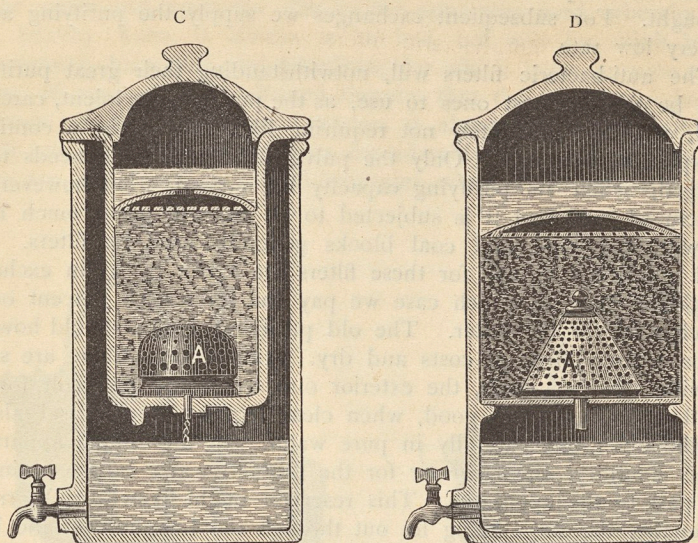
Portable filter

(double vessel)

partly with pulverized filling of the same sort of bone black as the preceding apparatus and partly with a plastic, porous coal block. Nickeled cock.

Size N:o	2	price each	Crowns	24.—
»	1	»	»	20.—

Portable anti-bacteric filter



with conic or semi-spheric purifying recipient, patented. This apparatus, consisting like the preceding ones of stone-ware with nickeled cock, contains a recipient A of the same matter, provided with a great number of straining holes and covered with a mantle asbestos cloth treated with silicate of alumina.

The lower part of the recipient is surrounded by a layer of pulverized carburet, chemically treated with silicate of alumina. This carburet has, pulverized, a surface of adhesion of about 200,000 square inches by each square inch of powder of 7 millimètres in thickness, whereby the carburet, besides its chemical power of purification, possesses a great physical force of retaining bacteria and other organisms. The other and essential part of the apparatus is filled with coarse grained carburet, likewise treated chemically. This apparatus, which rids water not only from organic matters but also from microscopic organisms (bacteria, infusories etc.) may be very easily cleansed by whomsoever, which cleansing is effected thus, that the recipient A, covered with asbestos, is removed from the apparatus and carefully washed either under a water-conduct cock or in a bucket. The pulverized carburet may then be collected and used indefinitely. The coarse grained carburet, on the contrary, is washed and rinsed carefully in pure water and thereafter dried in the air or by heat. The replacing of the purifying recipient into the apparatus is effected carefully, looking that the tube surrounded with packing of india-rubber adapts well to the apparatus, in order that no impure water may follow the purified one. When the coarse carburet has at last lost its purifying capacity, it is

exchanged against a new filling of coarse carburet, supplied, as well as a new set of pulverized bone black, gratuitously with every apparatus bought. For subsequent exchanges we supply the purifying agent at a very low rate.

The anti-bacteric filters will, notwithstanding their great purifying power, be the cheapest ones to use, as the purifying recipient, carefully treated, will last indefinitely not requiring like coal blocks a continual and expensive exchange. Only the pulverized bone black needs to be recharged, when its purifying capacity has ceased, what however, by the chemical treatment it is subjected to by us, will occur much later, than with the coal and coal blocks generally used for filters. Old wasted purifying agents for these filters are taken by us in exchange against new ones, in which case we pay the former 10 percent of the price charged for the latter. The old purifying agents should however then be returned free of costs and dry. Anti-bacteric filters are supplied with double vessels, the exterior one serving as reservoir for the purified water, and it is good, when cleansing the inner vessel, also to rinse the outer one carefully in pure water. In the simple apparatus, on the contrary, the reservoir for the purified water is placed in the lower part of the apparatus. This reservoir ought likewise to be rinsed occasionally, the slops being let out through the bunghole at the back of the apparatus. At places, where the water like that of the Stockholm water conduct contains little or no bacteria and where consequently the question is only to remove organic matters, the pulverized carburet may be reduced and principally the coarse one, surrounding the purifying recipient, preserved, in which case the apparatus will afford an increased and manifoldly greater quantity of purified water free from organic matters. When using pulverized carburet for removing bacteria the apparatus affords a less quantity of water.

Price of anti-bacteric filters

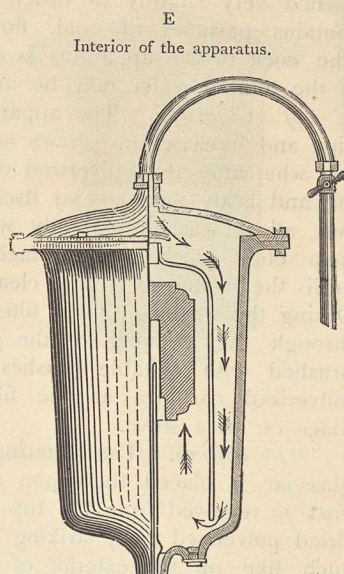
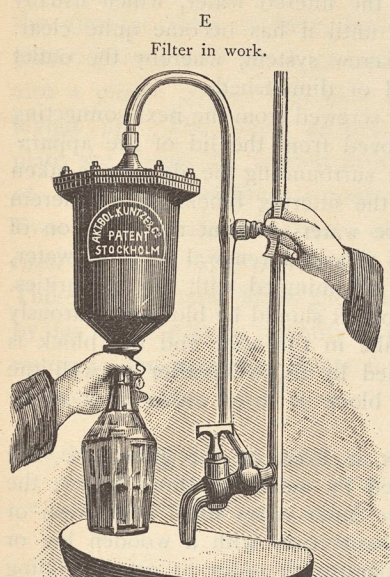
Size N:o 2, double vessel, pattern C		Crowns	25.—
» » 2, single » » D		»	23.—
» » 1, » » » D		»	20.—
» » 0, » » » D		»	17.—

Universal filter for water conducts

of metal, enamelled within, or of hardened glass with tinned leaden pipes and metal cock.

These filters are to be combined with the water conducts in kitchens, manufactories and stables etc. without influencing the outlet of the water coming directly from the water conduct. Such filters, although of a less filtering power than those according to our system, are since many years in use in the most part of the great towns of Europe.

The advantages offered by those filters consist in the great quantity of filtered water to be obtained through them in a very cheap way, say 2,000 to 5,000 litres a day, depending upon the pressure of the water and upon the size of the apparatus used, whereby a pure and healthy water is always to be had, not only for drink but also for cookery, breweries and laundries, for which latter purpose a great saving of soap may be effected thereby that the filtration reduces the hardness of the water and renders it almost as soft as rain water, which, as well known, reduces considerably the want of soap. Our filters are introduced in several breweries, where a soft and pure water is



wanted, amongst which we beg particularly to mention the great brewery of Carlsberg at Copenhagen, where many of our filters are in use. Those filters are to be procured in 2 different sizes, both provided with plastic and porous coal blocks and pulverized filling of prepared bone black.

Size N:o 1 E,	for families and domestic	
	purposes,	price each Crowns 25.—
» » 2 E,	for hotels, infirmaries, ma-	
	nufactories, breweries, stables	
	laundries, etc.	» » » 45.—

Where there is a considerable consumption of water, several of those filters may be combined one with another.

Such filters may also be applied to reservoirs, according to the figure N:o 18, and in this case it should be observed, that the greater the water pressure may be effected, that is, the longer the pipe uniting the reservoir with the filter, the greater the quantity of filtered water will be.

Mode of use.

a) Application. The leaden pipe N:o 1 with cock is soldered either to the rising pipe of the water conduct or to its cock or also to a reservoir, whereafter the apparatus is fixed by means of a hook on the wall, if possible higher up than the outlet cock, if any, of the rising pipe. The leaden pipe N:o 2 is fixed between the cock of the leaden pipe N:o 1 and the apparatus. Then the water is caused to flow through the cock into the apparatus. The cock is however as well the first time as at each following renovation at first opened very slightly in order to let the filtered water, which usually contains particles of coal, flow out, until it has become quite clear. The cock of the apparatus is of the screw system, whereby the outlet of the filtered water may be increased or diminished.

b) Cleansing. The apparatus is screwed from the next connecting pipe and likewise the screws are removed from the lid of the apparatus, whereafter the pulverized carburet surrounding the glass-jar is taken off, and lastly the glass-jar itself and the filtering blocks placed therein and all is washed carefully with pure water (without any addition of soap etc.) which is continued with repeated renewal of pure water, until the water is quite clear and not mingled with any impurities. During the washing of the filtering block it should be blown vigorously through the opening of the glass tube in the cork and the block is brushed with suitable brushes supplied by us; whereafter as well the pulverized carburet as the filtering block is dried either at a sunny place or on a stove.

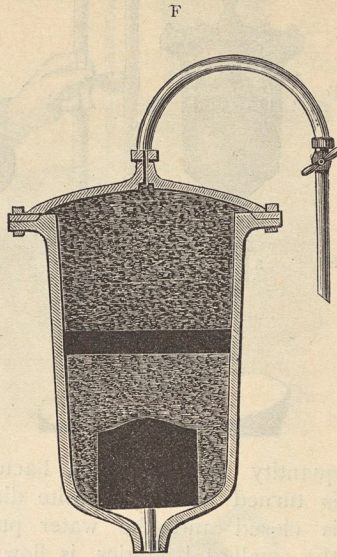
c) Filling. The filtering block is fixed on the glass tube, the glass-jar is placed thereupon and fixed by means of three hooks; the cork is removed from the top and the inner room filled with fresh or dried pulverized coal, striking at the same time with a wooden log or such like on the exterior of the apparatus in order to get the filling well packed. The glass-jar is then closed by the cork and the outer room is likewise filled with carburet; the little coal plate is inserted beneath the inlet of the lid of the apparatus, the india-rubber packing replaced and the lid cautiously screwed on. The screws should be tightened so uniformly as possible, and not too much at a time in order to prevent the breaking of the apparatus. All having thus been carefully reestablished the apparatus is connected with the water conduct, whereafter it recommences to work quite as before.

d) At a low pressure, as for instance in the top stories, the inner glass-jar is removed, whereby the resistance is diminished.

In Stockholm such water-conduct filters are also supplied on annual subscription at a very cheap price, say 10 crowns a year, inclusive of costs for the maintenance of the apparatus and its supplying with new purifying agent, when necessary. Such system of subscription on our water-conduct filters is established also in Copenhagen, St. Petersburg and Buda-Pest.

Anti-bacteric filters to be applied to water conducts in kitchens etc.

The exterior of the apparatus resembles that of the preceding ones and is applied in the same manner to the water conducting pipes. Its interior is however a little different. In lieu of the glass-jar there is here, besides the plastic porous coal block at the bottom, also a plastic porous coal plate situated higher up. The block as well as the plate are chemically treated with silicate of alumina according to our patent. Even the intermediate layers of pulverized carburet are chemically treated. These anti-bacteric filters afford however by far not the great quantity of purified water as the preceding filters for water conducts.

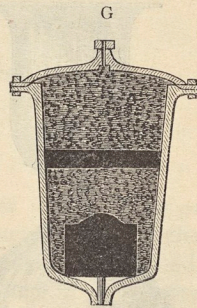


Size N:o 1 (F)..... price each Crowns 30.—
 » » 2 (F)..... » » » 50.—

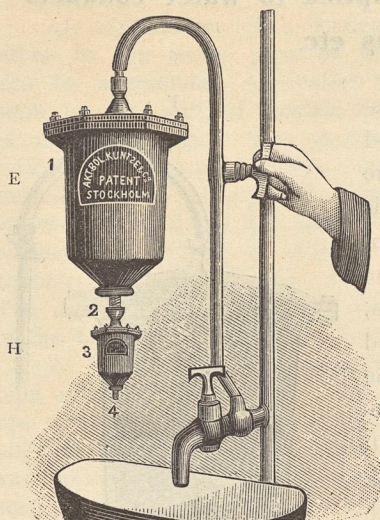
Anti-bacteric auxiliary filter

(patented).

This apparatus is a miniature of the anti-bacteric filter for water conducts F and made of the same material; it may be combined either with the universal water-conduct filter E or with any water conduct filter soever, wanting capacity of removing bacteries and other microscopic matters from the water. This small filter, the interior of which consists of the same ingredients as the anti-bacteric filter for water conducts F, is possessed of the same purifying power as the former with respect to bacteries and reduces likewise the quantity of microscopic organisms and organic matters in the water.



Extra anti-bacteric safety filter.



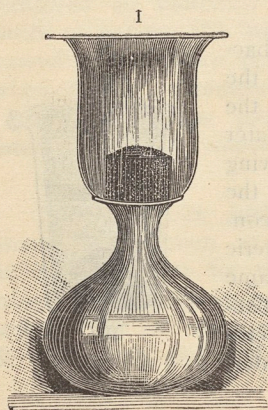
The anti-bacteric filter for water conducts F as well as the anti-bacteric auxiliary filter G affording by far a less quantity of purified water than the universal water conduct filter E, and water purified of bacteria being principally intended for drink, we have constructed a patented extra *anti-bacteric auxiliary filter* to be applied in the same manner as the next preceding one G, but with a double or combined cock, having outlets into both filters, as well into the big as into the small one.

If the cock be turned in one direction the outlet is closed for the great apparatus and the water is flowing down from the lower extra bacteric auxiliary filter H in a less

quantity but free from bacteria and fit for drink, while, if the cock is turned in the opposite direction, the outlet of the lower apparatus is closed and the water purified of organic matters although not of the smallest bacteria, is flowing from the great apparatus in the same quantity as originally. This construction affords thus the advantage of obtaining through the smaller apparatus a sufficient quantity of absolutely pure water for drink, while the greater one supplies water in abundance purified for cookery, laundries, etc. This extra anti-bacteric auxiliary filter may, like the preceding auxiliary filter G, be combined with not only our universal water-conduct filters E but also with every such filter of any foreign system soever.

Price for complete apparatuses with purifying agent:

Anti-bacteric auxiliary filter G with screw cock.....	Crowns 10.—
Extra anti-bacteric auxiliary filter (H) with special screw cock »	16.—



The preceding description of the mode of using the universal water conduct filter is essentially applicable also to the anti-bacteric water-conduct filters and to the auxiliary filters.

Table filters

of glass with filtering block or purifying recipient and filling of pulverized carburet according to our patent.

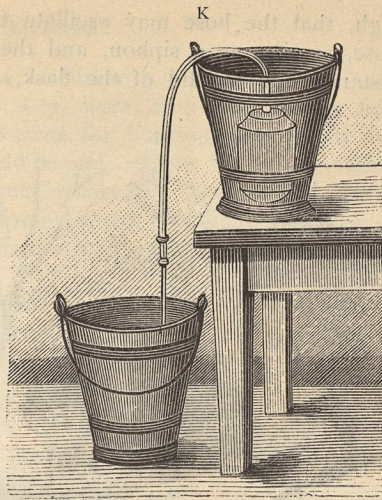
Price:

Complete	Cr. 6.—
Glass funnel with purifying agent »	4.50

Filtering block with hose.

The filtering block is placed in a bucket or another vessel filled with the water to be purified and the air is sucked out of the hose serving as a syphon. The purified water is then flowing through the hose into another vessel placed lower.

See the price of Syphon filters.

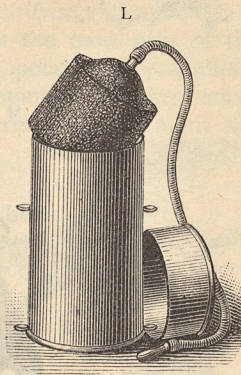


Syphon filters.

Price:

Complete with box, indiarubber hose and filtering block:

Diameter in millim.:	50	75	100	125	150
Crowns:	2.00	2.50	5.50	7.00	9.00

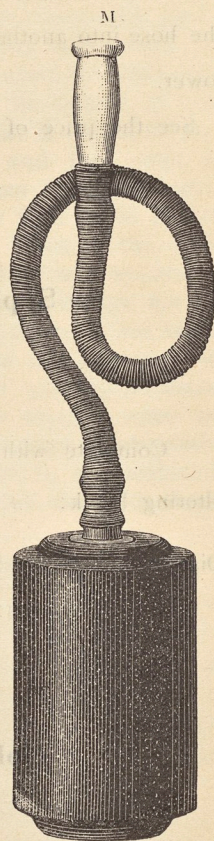


Soldier's and traveller's filters

(pocket-size).

The filter is immersed into no matter what water in the forest or in the field, in a lake, a river or a ditch, and by suction through the hose a pure and fresh water free from matters in suspension is obtained. The apparatus may also be employed as a syphon filter, in which case it is plunged for instance into the soldier's flask, which is placed so

high, that the hose may oscillate freely. The air is sucked out of the hose, serving as a siphon, and the purified water flows then down for instance into the lid of the flask.



Natural size.

Complete with block, hose and mouthpiece and an elegant
box Cr. 1.—
(Liberal discount granted on wholesale orders.)

Testimonials:

During the manoeuvres of 1884 in Skåne a number of 400 coal-filters manufactured by Kuntze & C:o were employed in the field battalion of the Svea Royal Life Guards for purifying the turbid and not potable water, which in the field is not seldom the sole resource of the soldier. My personal experience respecting these filters confirms entirely their advantage, as the proposed aim — the purification of the water of foreign matters mechanically suspended therein — was completely attained — — —.

The troop expressed a great satisfaction with the little contrivance, the simplicity, small dimensions and cheapness of which ought in my opinion justify a vast use of this filter.

Stockholm, September 12, 1884.

G. Setterblad,

First military surgeon at the Svea Royal Life Guards.

The undersigned having partly employed myself and partly seen the soldiers of the Royal Second Life Guards, during the manoeuvres of the current year in Skåne, use so called soldier's filters, manufactured by Kuntze & C:o, express hereby the opinion that said filters seem to offer a good, cheap and practical purifying agent, easy of transport and use, for purifying the water from the most part of the impurities which rather too often renders it not potable or prejudicial to the health. In consequence hereof I am of opinion that these small contrivances ought to be recommended very warmly and to merit the greatest possible use and spreading.

Stockholm, October 1, 1884.

Ed. Forssberg,

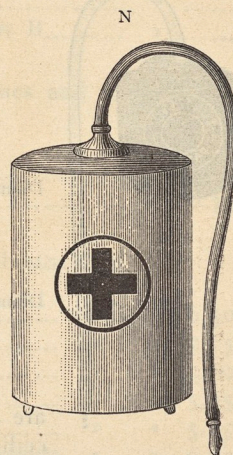
Second military surgeon at the Royal Second Life Guards.

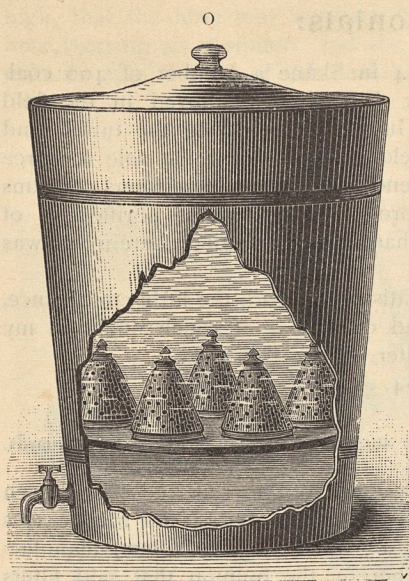
Ambulance filter.

This apparatus is of metal, painted and provided with the red cross. Capacity about $4\frac{1}{2}$ litres. It is plunged into a vessel placed at a higher level, the air is blown out of the hose serving as syphon and pure and fresh water flows down into the lower vessel according to the drawing K. This apparatus affords a great quantity of purified water, say about 27 litres an hour.

Price:

Complete Crowns





Cistern filter

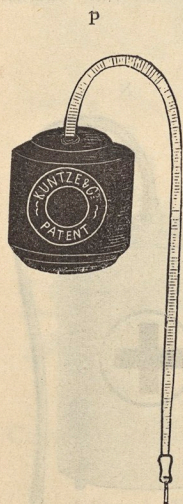
(of wood or sheet-iron in all sizes).

This apparatus, which may be had in all sizes, is of our own patented system constructed in conformity with our portable anti-bacteric filters. This filter not only possesses a great purifying power, but affords, besides, the greatest possible quantity of purified water, at the same time as it in the long run will prove to be the most cheap existing for the purpose, inasmuch as the purifying recipients do not, like filtering blocks, require a continual and expensive exchange, but may,

carefully treated, last indefinitely, whereby only the pulverized carburet need to be exchanged occasionally.

Price:

Complete for filtering.....litres an hour Crowns



Plastic porous coal blocks

(with or without hose).

Without hose.

N:o	1	2	3	4	5	6
Diameter in millim.	50	62	75	87	100	111
each Cr.	0.90	1.25	1.50	2.00	2.75	3.25

N:o	7	8	9	10	11	12
Diameter in millim.	125	136	150	173	198	222
each Cr.	4.00	6.00	7.00	10.00	15.00	20.00

(Blocks, chemically treated for anti-bacteric filters, are calculated with an addition of 30 % on the preceding prices.)

With hose and suction pipe:

N:o	1	2	3	4	5	6	7	8	9	10	11	12
Diameter in millim.	50	62	75	87	100	111	125	136	150	173	198	222
each Cr.	1.40	1.75	2.20	3.25	4.40	5.00	6.00	7.50	8.00	—	—	—

Plastic porous coal plates.

N:o	1	2	3	4	5	6	7	8
Diameter in millimètres	73	148	173	198	222	247	272	297
each Cr.	1.50	2.50	3.50	4.50	6.00	8.00	11.00	14.00

(Plates, chemically treated for anti-bacteric filters, are calculated with an addition of 30 % on the preceding prices.)

Price of purifying agents for exchange.**Filling of carburet.**

For anti bacteric filters:

Dose of carburet for portable filter, double, pattern C.....	Cr.	2.50
» » » » simple, N:o 0, pattern D »	1.50	
» » » » N:o 1, » D »	2.50	
» » » » N:o 2, » D »	4.00	
» for water conduct filters » F		
size N:o 1	»	-----
» N:o 2	»	-----
» for anti-bacteric auxiliary filter G & H ...	2.50	
» » water conduct filter (universal) pattern E		
size N:o 1	»	-----
» N:o 2	»	-----
» for portable filter, double pattern B.....	»	-----

Price of carburet in casks of 25 kilogrammes and more is calculated thus:

Carburet, pulverized per kilo	Cr.	1.50
» coarse » »	»	0.75

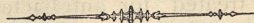
Price of purifying recipients with cover of asbestos cloth:

Size N:o 2	each	Cr.	6.50
» N:o 1	»	»	5.75
» N:o 0	»	»	5.00
» N:o 2 double	»	»	5.95
For water conduct filters	»	»	5.25
Conical india-rubber packings for the purifying recipients »	»	»	0.75

Notice.

The comparison between unfiltered water and water purified by our filters is most appropriately effected in two similar and quite white tea-cups of China. The difference will then be seen quite distinctly, which is not the case if the comparison takes place in two glasses.

In order to economize on the costs of freight and packing it is advisable to order the purifying agents for exchange at the same time as the filters.



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