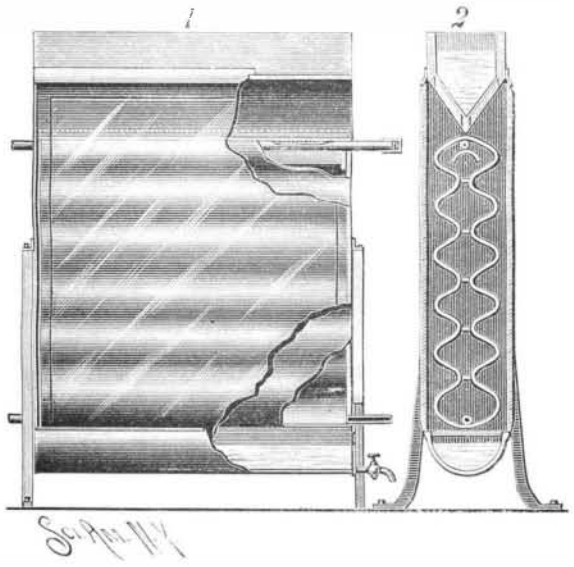
AN INEXPENSIVE AND EFFICIENT MILK COOLER.

According to this improvement, which has been patented by Mr. Frank J. Merz, of Fifth and Lane Streets, Seattle, Washington, the milk is cooled by being passed over the outer surfaces of corrugated metal plates, whose inner sides are kept cool by flowing water. Fig. 1 is a side view of the cooler, portions being broken away to show the interior, and Fig. 2 is a vertical cross section. End plates of the frame support a trough at the bottom and a hopper at the top, there being sockets in the upper side edges of the trough and in flanges of the frame to retain glass plates, which form the side walls of the cooler. Beneath the hopper an interior chamber is formed of corrugated plates of metal, attached at their ends to the end plates of the frame, and the top of this chamber is traversed by a water supply pipe having a series of openings in its top and side portions, over which is located a curved baffle plate or fender to direct the water issuing from the pipe against the side walls of the chamber. The water is thus made to flow along the inner side walls of the corrugated metal plates, passing off from the lower compartment through an outlet pipe. The milk to be

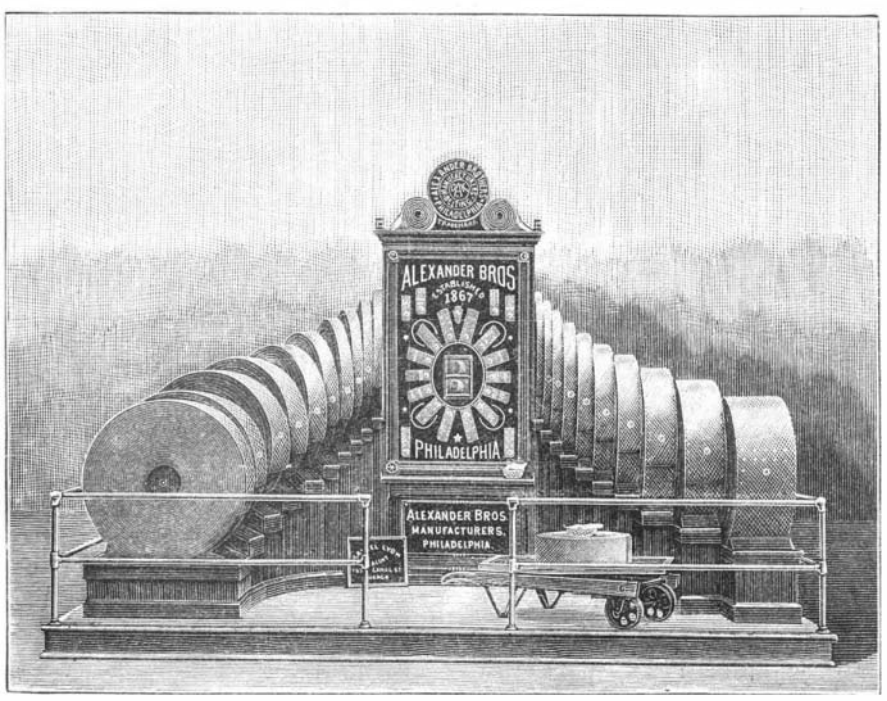


MERZ'S MILK COOLER.

cooled is placed in the hopper, at each side of the bottom of which is a series of holes, while within the hopper is a sieve or strainer entirely covering its bottom. The milk flows down the outer faces of the corrugated side walls of the interior chamber in the same manner that the water follows their inner surfaces, the milk being finally received in the trough at the bottom, where faucets are provided by which the cooled milk may be drawn off.

LEATHER BELTS AT THE FAIR.

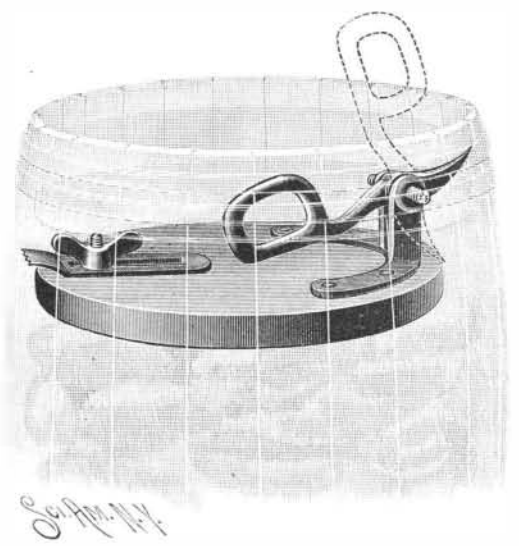
One of the very attractive exhibits in Machinery Hall is Alexander Brothers' show of leather belting. It occupies a prominent space on the central aisle, and is in all respects worthy the position. Our illustration gives a good general idea of the arrangement of the twenty large rolls of belting, the display of sample joints, etc., but the beautiful finish of the goods, the fine cabinetwork, etc., of the exhibit must be seen to be fully appreciated. Transparencies illuminated by electric lamps show the great five-ply leather belt made by this firm for the McCullough Iron Company, and a 51 inch three-ply waterproof leather belt, weighing 2,314 lb., which is still in good condition, after a night and day run of four years, at M. & W. H. Nixon's Company's paper mill, Philadelphia, though during that time the belt has been submerged over twenty-five times. A large quantity of belting is shown which for weight and quality, fine finish, and thorough workmanship commands the best trade of the country. It comprises single, double, light double, dynamo double, etc., with all the various kinds of laps and fastenings. This make of belting has a well established reputation for excellence. The factory is located at Nos. 410 and 412 North Third Street, Philadelphia. There is also shown a patent belt truck, the invention of Mr. Samuel Lyon, who is Alexander Brothers' agent, at No. 165 South Canal Street, Chicago. With this truck one man can handle the heaviest roll of any kind of belting, or coils of hose or rope, which can be reeled off or on at will. The exhibit is No. 3, group 69–26 J, 28.



THE WORLD'S COLUMBIAN EXPOSITION—ALEXANDER BROS.' LEATHER BELTS.

AN INSIDE COVER FOR BARRELS.

A cover for barrels, tierces, etc., to hold meat or other articles under a brine or pickle, is shown herewith, and has been patented by Messrs. John J. Friederichs and Henry C. Fliege, of Calumet, Mich. Upon one side of the cover is a slotted claw-tail piece, the position of which is adjustable, so that it will extend more or less beyond the edge of the cover and be held in place by a thumb screw. Near the other edge of the cover is a standard supporting a pivoted lever having a curved and sharpened outer end and an inner handle end. The dotted lines represent this lever in raised position, as it appears when the cover is being placed in the barrel, the bringing down of the lever causing the claw of the tail piece and the pointed end of the lever to engage the inner surfaces of the barrel. The device is very simple and inexpensive and does away with the necessity of using stones or other sinkers, which may be carelessly brought into service, and where accidental displacement frequently results in the spoiling of the meat.

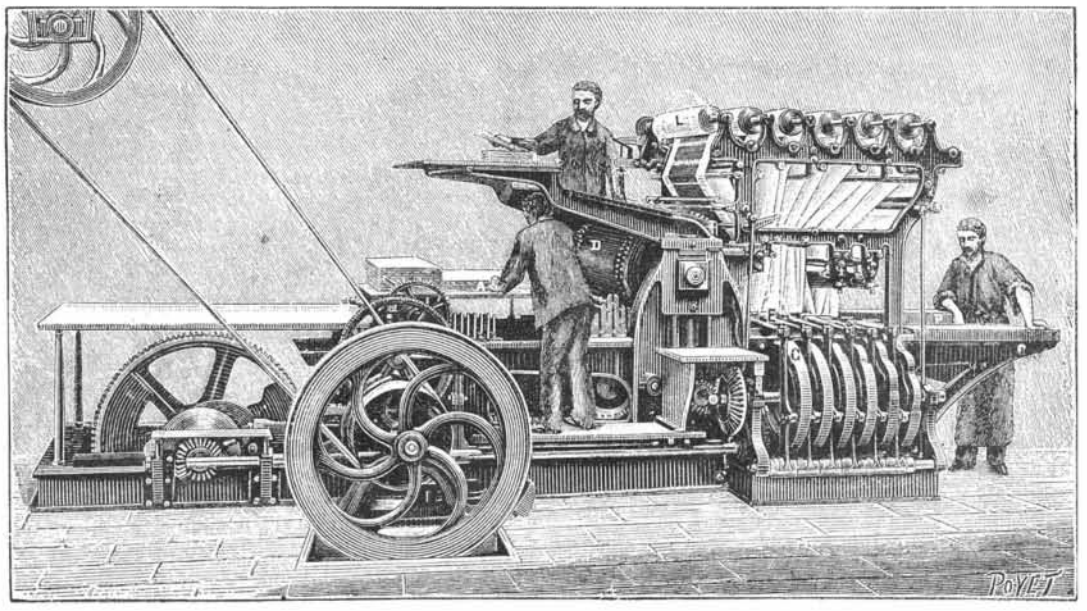


FRIEDERICHS & FLIEGE'S INSIDE COVER FOR BARRELS.

MECHANICAL PRESS FOR COPPER PLATE PRINTING.

The printing of copper plate engravings requires very particular care that up to the present has not permitted of intrusting the work to a machine, the hand of the workman alone being judged capable of giving the inking and the wiping of the plate the finish necessary for the obtaining of a good proof. As well known, what is called copper plate engraving is done upon plates of copper, either by means of aquafortis or the graver, and sometimes by these two means combined. It is the hollows in the plate that give the black lines, the parts not attacked being reserved for the lights. It is necessary, then, in order to obtain a good proof, to spread the ink very uniformly over the lines of the engraving, to carefully wipe the non-engraved parts and afterward to give a very strong pressure, in order that the paper may take up the ink in the hollows. It will be understood from this very brief description of the operation that this kind of printing can never be done with the text. It will be seen, besides, that if it is done by hand, it will take considerable time and the cost will be very high. That is why, in books, copper plate engravings are always printed outside of the text, and this increases the price of the work.

To succeed in printing along with the text is not to be thought of, since the latter is produced by reliefs. Other processes, such as engraving upon wood, etc., permit of this kind of printing; but what has been long sought for in copper plate engraving is to have the complete work of the printer done by a machine, so as to reduce manual labor. Tentatives have doubtless been made in this direction for a long time. We may mention especially a machine constructed in 1853 by Robert Neale, an Englishman. Many others



PRESS FOR PRINTING COPPER PLATE ENGRAVINGS.

also have sought a solution of the problem, but we cannot find that any have been successful. It was at the Exposition of 1889 that the first machines of this kind were presented that gave satisfactory results. They were devised by Mr. Guy. Since that epoch, however, we have not as yet seen them much employed. One of them is in operation in Berlin and another at St. Petersburg. In France it was judged that they needed some improvements, and they have up to the present been set aside. This was not the way to help to put them to a definitive point. Some months ago Messrs. Endes & Chassepot, copper plate printers, of Paris, had one installed in their printing rooms, and, as practical men, quickly saw what were the improvements to be introduced into it. They have now succeeded in deriving considerable advantage from it, and very recently we have been enabled to obtain an idea of the services that may be expected from these machines, for Messrs. Endes & Chassepot have in two days delivered the prints of a plate that by the ordinary process would have required nearly a month.

As in all mechanical presses, the machine consists of a table, upon which is fixed the type to be reproduced. This table has a to and fro motion, during which the type is inked in passing under rollers prepared for the purpose and then presents itself under a cylinder, which carries a sheet of paper, and bears strongly against it in order to give the impression. The new and interesting part that constitutes the copper plate press is found toward the right of our engraving. At the upper part are seen rollers, L, each carrying a wound-up band of cloth. The extremity of this band passes under a horizontal rod, F, and afterward winds up under another cylinder not visible in the figure. The rod, E, receives by means of disks, C, provided with cams, a rapid to and fro motion in various directions, so as to produce the effect of the hand wiping with a cloth. These rods, six in number, are provided with flannel tamkins, under which the cloth is constantly renewed, and constitute the rubbers designed to

clean the plate after it has been inked. The first, L, is charged with the greatest part of the ink in excess, since the five others finish the business, and the last must preserve its cloth almost immaculate. If we suppose the plate properly inked for the first time, the following are the series of operations through which the continuous printing by the machine will be effected. Starting from the point, P, the plate passes under the rubbers, which, at this moment, are raised automatically and do not touch it. It goes under the cylinder, D, which has received a sheet of paper and which prints it at the moment at which the plate is passing beneath it, leaving the printed sheet in the hands of the pressman, while the plate continues on its way. It passes under the inking roller and afterward returns in an opposite direction. This time it passes under the cylinder, D, without touching it and reaches the rubbers, E, which are depressed and perform their office. It then rebegins its course in an opposite direction, and so on.

It is possible with this machine to print from 1,200 to 1,500 copies per day, while by the ordinary process scarcely a hundred can be printed. There is here, then, a real progress that will permit of giving more easily, and without too great an increase of cost, copper plate engravings in books and in journals that publish plates outside the text.—*La Nature.*

Notes from the World's Columbian Exposition.

(*Continued from page 195.*)

from the ordinary scow to the latest improved launch. Venice contributed a state gondola, upholstered and bedecked sumptuously, and rowed by six gondoliers, dressed in mediæval costumes, also ordinary gondolas and fishing boats. Crews of Ottomans manned several distinctive Turkish crafts; half-dressed Dahomeyan natives paddled two curious dugouts; Esquimaux displayed their skill in the use of kayaks; Quacktail Indians, from British Columbia, paddled about in one of their grotesquely decorated dugouts; and there were peculiar fishing boats from Norway, South Sea Island crafts, as well as boats from Ceylon, Java, Egypt, Brazil, Japan, and other corners of the earth.

The feature of the afternoon was a procession of land vehicles which represented nearly every country that has an exhibit in the Transportation building. The procession was headed by Turkish sedan chairs, African palanquins, and other vehicles carried on the shoulders of men. Then followed an array of donkeys and camels harnessed in saddles used in various parts of the world, and carrying loads of different kinds, the several drivers being dressed in their native costumes. The remaining part of the procession comprised several historical vehicles and a long line of carriages of the latest patterns, from phaetons to tally-ho coaches. There was the state carriage of Abraham Lincoln, a vehicle that looks odd now, because of its antiquated design, and which is the worse for wear, as its once beautiful trappings are now badly faded and time-stained, but nothing in the day's observance so stirred the hearts of the multitudes as the appearance of this vehicle. The state carriage of the late Dom Pedro, of Brazil, was also in the procession. A large display of bicycles ended the pageant. This same day was also California Day, and it was observed in characteristic style. In addition to the regulation exercises of speech making, etc., several car loads of fruit were given away. Great stacks of luscious-looking fruit occupied a large part of a lawn at the southeastern corner of the State building, and at the appointed time men endeavored to give it out in small packages to each applicant, but thousands of people jammed into the space, and the crush was so great that, finally, the fruit was distributed any way to get it into the hands of the surging crowd.

The great Schuckert search light, illustrated on the first page of the SCIENTIFIC AMERICAN of September 2, has a formidable American rival, which has just been placed on the colonnade between the Palace of Mechanic Arts and the Agricultural Palace. The reflecting lens is not quite as large as in the German lamp, but is designed to be more powerful. This lamp will require about 200 amperes of current. The upper carbon is 1¼ inches in diameter and 22 inches long, while the lower carbon is the same size, but only 15 inches long. The carbons are set in such relation to each other that the reflector absorbs all the light from the incandescence of the carbons as well as the light of the arc. The lamp is rated at about 100,000 candle power, and its light, when magnified by the reflector, will reach 200,000,000 or so candle power.

Harriet E. Wilson, writing to *Minerals*, tells of some of the minerals to be seen in the Palace of Mining:

"While looking at the carbonates—calcites and dolomites—I thought: Ah, nature, what art thou not doing! Converting such beautiful things out of limestone. There was a bird's nest with four tiny eggs in it, and a basket with pears and hazel nuts, all incrustated with lime, from Clermont, France, and formed by water flowing down over steps, the spray falling on the objects, and as it evaporates it leaves a deposit of carbonate of lime.

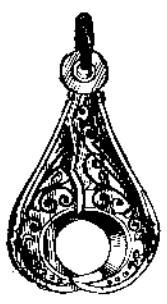
"There was a fine collection of minerals which are used as gems, cut, polished, and in cases. Also imitations of noted diamonds and a case showing the different styles of cutting diamonds. In Mr. Ward's collection are copies of celebrated gold nuggets, the largest of which is the Welcome nugget, found June 11, 1858, at Ballarat, Victoria, Australia, weighing 2,166 ounces, value $41,883.

"In the collection of Mr. A. B. Crim, of Middleville, N. Y., are sections of rock showing cavities containing carbon, calcite, and quartz crystals; quartz crystals doubly terminated; tube containing 1,000 quartz crystals, weight 3¾ grains, 128,000 to the ounce, all from famous Herkimer County.

"Speaking of crystals, every person should visit the crystal cave from the Black Hills, now being exhibited in Horticultural Hall, just under the mountain underneath the dome. The original cave is about twenty miles from Harney Peak. It has been explored fifty-two miles, and the admittance is $1. Here you can see it for nothing, and if you buy $10 worth of specimens or pictures they will give you a ticket admitting you into the cave any time within three years. The entire exhibit is for sale at $50,000.

"Iowa has a coal mine, miner at work, and car loaded with coal: coal value, 1892, $9,800,000; production, 1892, 7,000,000 tons. Model of the Centerville coal mine of Appanoose County. Mantel piece, fireplace, and hearth, with ornaments, made of wave marble; slab unfinished; ores of iron, lead, zinc, or dry bone. A specimen of lead weighs 500 pounds; was at the New Orleans Exposition. Geodes from Keokuk; marble from Warekauase; paper weights and book weights made out of bird's-eye marble, fish-egg, and cat's eye. Mottled stone, color brown and white; variegated sandstone, white and red; glassware made from Iowa sand, white, blue, black, and green. Clays in jars. A monument made of Iowa cement; magnesian limestone, lithographic stone, and yellow sandstone; clays, bricks, and tiles before and after burnt."

A CONVENIENCE FOR SMOKERS.



A neat and quite ornamental little device, designed to serve as a convenience for smokers, is manufactured by Messrs. Enos, Richardson & Co., of Maiden Lane, New York. It is a sterling silver cutter for removing the ends or tips of cigars, before one lights the cigar. As will be seen by the picture, it may be hung on a watch chain, where it will be always ready for use.

The Use of Salicylic Acid as a Preservative.

As the time arrives for the collection of fruits, the question, "How shall we preserve our crop for winter use?" comes up again for consideration. That it is not yet settled to every one's satisfaction is sufficiently evidenced by the number of questions on the subject which appear every autumn in the papers partly or entirely devoted to domestic interests. A variety of plans are suggested for preventing the fermentation or moulding of fruits and preserves. Thus, some lay great stress, in preserving whole fruits, upon the selection of only the soundest material; upon treating it at once; upon heating it, covered with sirup, in glass vessels, etc. Unfortunately, even when all precautions are taken, the result is by no means always satisfactory. Another practice much recommended at one time was that of pouring chloroform over the fruits and hermetically sealing. This plan seemed to answer very well until it was found that the chloroform communicated a curious flavor to some fruits, which no amount of cooking could remove.

Then, with regard to jams, the same difficulty has been experienced. The proneness of these preparations to change is well known, and attempts have been made to minimize it by a number of devices more or less successful.

In salicylic acid, however, we have a ready means of preventing such loss of material and the consequent annoyance and disappointment. In the proportion of 4 to 8 grains per pint or pound, salicylic acid prevents fermentation and the formation of mould in any saccharine liquid. Fruit juices of all kinds, jams, preserves, and the like can be in this manner kept unchanged for years.

Experiments have shown that apple and pear *compote* prepared with only a small quantity of sugar (1 lb. to each 5 lb. of fruit), after ten months, during which time the vessels had been frequently opened and various portions removed, showed no trace of mould or acidity, or of fermentation. Similarly, cherries and blackberries may be preserved with from one-fifteenth to one-tenth their weight of sugar; in the presence of a small proportion of salicylic acid they keep from one year to another with unaltered taste and quality.

With regard to the manner of applying the preservative, it may be added as it is to the jam in the process of preparation. It is advisable to gradually introduce it in the solid state into the boiling mass with constant stirring, or the acid may be rubbed down smooth with a portion of the fruit juice and then added to the whole. In any case the finished product ought not to show any white flocks.

A peculiar method of preserving with salicylic acid is to pour over the cold uncooked fruit the cold salicylated juice of the same fruit, so that the former is entirely covered. The cold salicylated juice is prepared by pressing out the fruit, heating the juice, adding to every pound 15 grains of salicylic acid, and allowing to cool. In this way fruits, such as cherries, plums, etc., can be preserved through the winter uncooked, so that they are suitable for any and every kind of application, even for use in pies.

The advantages of salicylic acid in the preservation of fruits and fruit preserves may therefore be summed up as follows. If properly applied, it is always successful; it does not communicate any unpleasant flavor to the preparations; it is in no way injurious to the consumer, being present only in minute quantities.—*Chem. Tr. Jour.*

Photographic Discovery of Asteroids.

One of the most remarkable of recent astronomical developments is the result of the application of photography to the discovery of asteroids or minor planets.

By the old methods of search the annual rate of discovery ranged from one to twenty, the average for the twenty years, 1872-91, being 10·2. In 1892 twenty-nine were discovered, two only by the older method, while between Jan. 1 and April 15 of the present year twenty-five were picked up by the two observers, Wolf, of Heidelberg, and Charlois, of Nice, who have pressed the camera into service.

The negatives are made with an exposure of from three to five hours, each covering an area two or three degrees square. On the plate the images of the stars are round, clean, while any planets or planetoids which may be present are at once recognized by the elongation of their images due to their orbital motion; and three or four of these oblong lights are sometimes found on a single plate. If the number of observers using this method should be much increased, the number of annual discoveries may easily mount into the hundreds. The total number of these little bodies which circulate in the space between Mars and Jupiter stands at 375 so far as now known, but it is almost certain that those still undiscovered must be counted by the thousand, and obviously it will soon be hopeless to attempt to keep the run of them all.

We may reasonably suppose that all the larger ones have been already discovered and that those still remaining are all extremely minute. It is true that from a certain defensible standpoint the size of a planet has nothing to do with its astronomical importance. Mathematically considered a planetoid's orbit is just as worthy of investigation as that of Jupiter itself, but practically it is plain that the computers will be obliged to select a limited number which present special points of interest and confine their attention to them alone.—*Prof. C. A. Young, in Inter-Ocean.*

Philistine Records of the Hebrew Invasion.

Science contains an interesting account of the Tell-el-Amarna tablets, from the pen of the Rev. Thomas Harrison, of Staplehurst, Kent. These tablets, 320 in number, were discovered by a fellah woman in 1887 among the ruins of the palace of Amenophis IV., known as Khu-en-Aten, between Missieh and Assiout, about 180 miles south of Cairo. They have been found to contain a political correspondence of the very greatest interest, dating from some 3,370 years back. Many are from Palestine, written by princes of the Amorites, Phenicians, Philistines, etc., the burden of almost all being: "Send, I pray thee, chariots and men to keep the city of the King my Lord." Among the enemies against whom help is thus invoked are the *Abiri*, easily recognized as the Hebrews. The date fixes that of the Bible (1 Kings vi. 1) as accurate. Many names occur which are familiar in Scripture, as, for example, Japhia, one of the kings killed by Joshua (Josh. x. 3); Adonizedek, King of Jerusalem (ditto); and Jabin, King of Hazor (Josh. xi.) Very pathetic are the letters of Ribadda, the brave and warlike King of Gebel, whose entreaties for aid are observed to grow gradually less obsequious and more businesslike as his enemies prevailed against him, robbing him eventually of his wife and children, whom he was powerless to protect. But the greatness of Egypt was waning under the nineteenth dynasty; enemies were pressing her at home, and the chariots and the horsemen went not forth.

Cholera a Nitrite Poisoning.

Emmerich and Tsuboi, according to publications in the *Munchener med. Wochenschrift*, come to the conclusion that cholera is a nitrite poisoning, basing their conclusions upon the facts that the cholera bacillus is able to a greater extent than any other bacillus to reduce nitrates to nitrites and the internal administration of nitrites in quantity of 0·5—0·6 gm. is capable of producing very similar physiological effects in man. While other varieties of bacteria are capable of forming nitrites, none of these thrive in the intestines.—*Apotheker Ztg., 1893, 322; Amer. Jour. Pharm.*