ventor utterly fails to appreciate the real value of foreign fields of operation. The opportunities offered at home are large enough to satisfy his ambition; and he does not know what he could do with foreign patents it he had them. The more enlightened of our inventors, however, are finding out the impolicy of such indifference to European markets; and before many years the neglect to take possession of them will form the exception and not the rule.

Our national redress, therefore, against the lawful appropriation of unpatented American inventions abroad, and the consequent loss to our national income, is rather through the enlightenment of our inventors by means of information such as the Leipsic consul sends, than through any attempt at retaliation by the exclusion of foreign inventors, as Commissioner Paine is reported as favoring. The *Post* writer says:

"The only practical measure of redress open to our government would be to adopt a scale of fees for foreigners to correspond with those charged to American inventors. This course, the commissioner thinks, would speadily bring about a desired change, as foreign inventors regard the American market as an exceptionally good one for mechanical devices, and are always anxious to take out American patents."

Possibly it might, but we should be the heaviest losers by the attempt. The expressed object of the American patent system is the advancement of the useful arts—the multiplication and perfection of American industries. To accomplish this end, inventions are encouraged by offering the inventor, for a term of years, the exclusive right to use, make, and sell his invention and its products. The nationality of the inventor has nothing to do with the matter. If his invention is new and useful we want the benefit of it; and we are more likely to reap that benefit by treating him fairly than by trying to exclude him or rob him. The circumstance that certain foreign governments do not show a corresponding willingness to accept the benefits offered them by American inventors is no excuse or reason for our imitating their unwisdom. The moment we look upon inventions in their proper light, as the bases of new industries and the improvement of old ones, all talk of retaliating against foreign shortsightedness in the matter of patent rights, by handicapping foreign inventors, is sheer nonsense. The best way to induce foreign governments to treat American inventors more liberally is to prove to them by our industrial progress the vital advantage of treating liberally all inventors, their own as well as ours.

Be that as it may, the fact remains that most European governments do now offer our inventors privileges that are worth securing, though at a somewhat higher cost than we are accustomed to here, and every year those privileges increase, and rapidly increase in money value.

GELATINE NEGATIVES.

Much success has of late attended the production of photographic negatives in which a substratum of gelatine is used as the vehicle to carry the sensitive silver instead of collodion. It was claimed, among other advantages, that the gelatine was cheaper than the collodion. It seems now to have been ascertained in England that for the damp climate of that country, at least, the gelatine negatives are unstable. The film expands and contracts, under the varying degrees of atmospheric moisture, to such an extent that the usual varnish soon cracks and the surface is covered with a fine powder, while the surface of the gelatine retains the markings of the cracks, and the negative is spoiled. To prevent this loss of negatives, it is recommended that gelatine negatives be covered with a film of collodion and then varnished. The collodion has a greater expansive quality than the varnish, and does not crack. It perfectly preserves the gelatine negative. But inasmuch as collodion makes first-rate negatives, would it not be better to omit the gelatine altogether?

In the meantime we will suggest that the latest improvement in the production of gelatine plates—formulæ for which we have heretofore published—consists in adding a quarter of a grain of gelatine to the solution of bromide employed in precipitating the silver. This simple little change gives ease and certainty to the production of dry gelatine plates of the highest sensitiveness. This improvement confirms the suggestion of M. De Pitteurs, that the remarkable sensitiveness of gelatine plates is due to a chemical combination between the gelatine and silver which favors the action of light on the bromide of silver.

THE DISSOCIATION OF CHLORINE.

Employing the improved method of determining vapor densities, which he introduced last year, Professor V. Meyer, of Zurich, has lately subjected chlorine to a series of tests which strongly indicate a compound character for that hitherto supposed element. As described in *Nature*, the apparatus employed is also extremely simple, and consists of a cylindrical bulb of about 100 c.c. capacity, sealed to which is a glass tube about 6 mm. in diameter, and 600 mm. long; this tube is widened out at the open end, so as to admit of the introduction of a caoutchouc stopper, and has a side tube, 1 mm. in diameter and 140 mm. long, sealed on to it about 100 mm. below the open end. The side tube is once bent nearly at right angles and the end slightly turned up, so that, when dipped into water, it will deliver gas into a graduated glass vessel inverted over it. For determinations at high temperatures the bulb is constructed of porcelain and is heated in a gas furnace; when operating at lower temperatures the bulb is heated either by means of a vapor bath or in a bath of molten lead. The operation consists in heating the bulb until it acquires a constant temperature, which is indicated by the non-appearance of air bubbles at the orifice of the side tube which is plunged under water; the stopper is then removed, the weighed quantity of substance introduced and allowed to fall into the bulb, the stopper quickly reinserted, and the end of the side tube then brought under the measuring vessel; directly air ceases to issue from the extremity of the tube, the stopper is removed, and the air thus collected is afterward measured in the usual manner. In the case of substances which undergo oxidation when heated in air, the air is first displaced from the apparatus by a current of pure nitrogen. In this manner the volume of vapor, measured at the atmospheric temperature and pressure, generated by a known weight of substance, is ascertained, and the density deduced from these data by a simple calculation.

Experimenting with chlorine the numbers obtained at a temperature about 620° C. agreed with those required on the assumption that the chlorine molecule has the formula Cl_2, which is that generally accepted. At higher temperatures, however, a diminishing density was determined, until at about 1,200° and above, the density was two thirds that obtained at 600°. In this respect the action of chlorine, when heated, is precisely like that of oxygen when passing from the condition of ozone to its ordinary condition. Two explanations are possible. Either what is regarded as the atom of chlorine is (like ozone) a compound of three subatoms, with the formula Cl_3 (instead of Cl_2 as commonly held), or chlorine is not an element, but a compound of at least two elements which are dissociated by heat.

In confirmation of the correctness of the latter supposition, there comes the report from Zurich, printed in the *Chemical News*, that Professor Meyer, in conjunction with Herr C. Meyer, has determined that in all probability oxygen is one of the components of chlorine. Still further, an unconfirmed report has reached *Nature* to the effect that the Messrs. Meyer have actually separated oxygen from chlorine. Should these reports be confirmed, the chemistry of the non-metals will enter at once upon a new era. In the communication to the Berlin Chemical Society, describing the experiments noted, the Messrs. Meyer state that bromine behaves like chlorine; and if chlorine has been dissociated, the rest of the group are likely soon to follow.

THE NORTHWEST PASSAGE SUCCESSFULLY MADE.

The Swedish exploring steamer, Vega, of the Nordenskjöld expedition, arrived at Yokohama, Japan, Sept 2. The Vega was in excellent condition; all on board were well, and there had been no sickness or scurvy on board during the long Arctic winter.

The following report of the entire voyage, as told by Professor Nordenskjöld, was telegraphed to the New York *Herald*. The Professor says:

"We sailed from Gothenburg on July 4, 1878, and a four days' sail brought us to Tromsöe (a Norwegian port on an island of the same name), where our outfit of furs and necessaries for the high latitudes was completed. Here we were joined by the companion steamer, the Lena. On July 25 both vessels sailed from Tromsöe, passed through the Yugor Strait (south of Nova Zembla) on August 5. There was not a particle of ice to be seen between the Waigatsch (Vaigatza, a Russian island) and the continent. The Kara Sea, hitherto dreaded by all sailors in the Arctic regions, was equally free from ice, and anchor was cast at Port Dickson, near the mouth of the Yenisei, on August 6.

STEERING NORTHEAST.

"After a three days' delay there the two steamers of our expedition steered northeast toward the dreaded Taimur land and the North Cape. The ice arrested our passage and we were compelled to remain at Tajoyr (Cape Taimur?) four days. On August 19, Tsejdekin, the extreme northern point of Asia, was reached, where a short rest was taken. The Vega coasted the peninsula, very little ice being encountered, and anchored at the mouth of the Lena River on August 26. To the northeastward were the islands of New Siberia, which we soon sighted, but were unable to explore because of the great field of ice that girt their shores. The mouth of the Kolwya River (latitude 69 deg. 30 min., longitude 161 deg. 30 min.), a broad estuary, was found open, and we hastened to make all possible progress eastward. Our difficulties soon began, however, and increased daily. We were delayed much with the ice between Cape Cook and Van Karema. We crossed Kolintsehm Bay on September 27 with comparative ease, but were imprisoned on the 28th near a Tchuktchi settlement (latitude 67 deg. 7 min. north, longitude 177 deg. 24 min. west).

THE WINTER IN THE ICE.

"We wintered in the pack ice at this point, one mile from land. The entire ship's company maintained the best of health and spirits. Not a single case of scurvy occurred on board. During the shortest day the sun was above the horizon less than three hours, and then only the upper limb was visible. At this point much time was devoted to interesting scientific and ethnographic studies. There were 4,000 inhabitants in the several villages near by, who subsisted by fishing and sealing. They are called the Tchuktchi, and are a very agreeable class of people for an exploring party to meet. They supplied the expedition with bear and reindeer meat. The cold was intense, averaging 36 centigrade (32.2 degrees below Fahrenheit.) The game was abundant in the spring, wild fowl being taken in large numbers. We were detained in the ice at this point 264 days, but were released on July 18, and passed East Cape into Behring Straits on the 20th. Such is the story of our voyage.

COMPLETE SUCCESS.

"I fully accomplished the object for which the expedition was sent out by Dr. Dickson—namely, a practical proof of the existence of a Northeast passage. Then the Asiatic coast was followed and St. Lawrence Bay was crossed to Port Clarence, Alaska. Thence we crossed to Koniyan, dredging carefully in order to determine the formation of the bottom of the sea, many specimens of the fauna and flora being obtained. The location, breadth, velocity, and approximate volume of the currents of the Arctic and Pacific Polar currents were charted and calculated. Having touched at St. Lawrence Island we next proceeded to Behring Island, where we received the first news from Europe through the resident agent of the Alaska Trading Company. The fossil remains on Behring Island are of immense variety. A new marine animal was here discovered, which we named *Rhytina stelleri*. The Vega left the island on August 19, and had a pleasant voyage until August 31, when a severe gale was encountered, accompanied with lightning. During the storm the lightning struck and shivered the maintopmast, slightly injuring several men. We arrived off Yokohama at half past eight on the evening of September 2. All are well, and no deaths have occurred during the voyage.

PROSPECT.

"The Vega is the first vessel to make the passage, and I think the voyage from Europe to Asia by Behring Strait is certain and safe, with very little more experience of navigation in the Northern seas. From Japan to the mouth of the Lena River there are no difficulties in the proper season for experienced sailors. The Lena River taps Central Siberia, and a large prospective trade can readily be developed.'

Apart from the obvious commercial advantages to result from the outlet to Siberian trade, opened up by this plucky and successful voyage of the Vega, and the contribution to science made thereby, it is impossible as yet to estimate the probable good results of the expedition. If, as Professor Nordenskjöld believes, a safe and easy Northeast passage is demonstrated, its availability must be confined to two or three summer months at best—too brief a period for an established commercial route; and vessels which take the southern routes during ten months of the year, are not likely to venture into icy waters for a single trip, however much it may promise to save in distance. With good luck the northern voyage, say from England to Japan, might possibly be made in half the time now required, but instead of having open sea room for the most part, the trip would be mainly along a dangerous and inhospitable coast in a narrow channel between ice fields and foggy shores, with the ever imminent risk that northerly winds might at any time bar the passage with Arctic ice floes, and imprison the ship for an Arctic winter.

Under improbably favorable conditions the Northeast passage may prove a useful route between Western Europe and our Pacific coast; but it will require more than one successful passage—a two seasons' trip at that—to induce many shipmasters to go that way.

PLATINUM IN THE UNITED STATES.

Notice was taken some time since of Mr. Edison's circular letter of inquiry with regard to the possible occurrence of platinum in various parts of the country. Mr. Edison informs us that, so far, he has received some three thousand replies. Instead of being an extremely rare metal, as hitherto supposed, platinum proves to be widely distributed, and to occur in considerable abundance.

Before Mr. Edison took the matter in hand platinum had been found in the United States in but two or three places—in California and in North Carolina—and in these places it occurred but sparingly. It is now found in Idaho, Dakota, Washington Territory, Oregon, California, Colorado, Arizona, New Mexico, and also in British Columbia.

It is found where gold occurs, and is a frequent residual of gold mining, especially placer mining. Mr. Edison thinks he can get 3,000 lb. a year from Chinese miners in one locality. One gravel heap is mentioned from which a million ounces of platinum are expected. Hitherto the product of the entire world would not suffice to supply electric lamps for New York city. Now Mr. Edison believes that our gold mines will supply more than will be required. The possible uses of this metal in the arts, however, are so numerous that there is no danger of an oversupply.

In addition to platinum Mr. Edison finds, among the large number of samples received daily, many other valuable metals and minerals, so that his researches in this direction are likely to result in increasing greatly the resources of our country in respect to the rarer and more costly minerals and metals.

THE *Insurance World* thinks our present complicated system of fire alarm telegraph should be substituted by the much more desirable system of telephonic communication. The advantages, like an axiom, are so self-evident as not to admit of any elaborate demonstration.. One of the special features is that it will enable the person sending in the alarm to affix the exact location of the fire, and thus obviate the necessity of the firemen hunting for the exact point in the district at which their services are needed.

Bog Oak Ornaments.

A gentleman, connected with the manufacture of ornaments from Irish bog oak, gives to *Land and Water* some interesting particulars with regard to the history of that industry. When taken up this bog oak is perfectly black from the action of the peat or bog water. It is very rarely obtained in a sound state, and in most cases the outer portions of the tree or log are rotted, and useless even for fuel. When laid up for use, care must be taken that it is not placed in the open air, lest it may, from the sun's rays, become open and shattered into chips from end to end. To preserve it, it must be put into some cool place, and left to dry gradually, and when properly seasoned it must be cut in lengths of from two to four feet, and these lengths be split again, and the sound parts removed from the unsound.

It takes from four to six years to season some specimens, as in many instances the wood is found at a depth of eight and sometimes ten feet under the surface. When properly seasoned, any portion requiring to be glued becomes hard as stone, and is firmer and less liable to give way than any portion of the manufactured article. The finish is not quite perfect until the article has been for some time in use, and the longer, the finer the article seems to be, no matter whether used as a personal or table ornament. The men employed are all, without exception, self-taught; each one makes his own tools, and will not take any apprentices; and each person has a peculiar taste for a certain class of ornaments, which he follows, and to which he is left to produce the best specimens he can. There are also jewelers who mount and embellish the ornaments with gold and silver, and with rare and most brilliant Irish gems, such as the Kerry Irish diamond, the emerald, the garnet, amethyst, beryl, aquamarine, and Donegal pebble. The Celtic ornaments are generally studded with the above native gems; they are beautiful, and most artistically executed. The designs embrace some thousands, and all of them are both classic and historically illustrative of Irish antiquities. Extensive deposits of bog oak and other buried woods have been discovered in Germany.

Lesseps and the Canal.

M. De Lesseps would have made a good actor if he had not been a successful engineer. He has been making a tour of France, visiting the commercial cities and lecturing on his new scheme of the Panama Canal. He carries with him his little daughter Totötte, and she goes to the public meetings at which her father speaks. When she becomes drowsy, M. De Lesseps points to her and says: "That little girl will fire the first mine when we come to quarry the canal." Then Mlle. Totötte awakes, and the crowd enthusiastically cheers.

SKIMMING MILK BY CENTRIFUGAL ACTION.

One of the results of modern systems of dealing with agricultural produce has been the growth in most civilized countries of large establishments for carrying out dairy operations in a wholesale way, such establishments being really manufactories in which mechanical appliances can be largely and profitably used to assist or replace handlabor. Among the operations to be performed in connection with such dairies, the skimming of milk occupies no unimportant place, yet until comparatively recently no efficient means of accelerating the ordinary mode of separating the milk from the cream had been perfected. As is well known, the mixture of the milk and cream is a purely mechanical one, the lighter fatty particles of the cream being as it were entangled in those of the milk, and separating from the latter by the action of gravity if the mixture is allowed to remain undisturbed for a sufficient length of time.

Experience has shown that the separation of the cream and milk is facilitated by maintaining the latter at a low temperature; but even under the most favorable circumstances the natural separation of the two substances is a slow operation. The shortest time, in fact, in which the separation has ever been thoroughly produced—so long as the ordinary action of gravity is relied upon to effect the operation—is, we believe, about twelve hours, the milk in this case being treated on Mr. Senwartz's plan, and kept at a constant temperature of about 50° Fah by means of ice. According to the mode of procedure usually followed in this country and in Europe, the separation of the milk and cream occupies from 24 to 96 hours, the result being that in some cases the milk will not stand the period of exposure required to effect the thorough separation of the cream.

Under these circumstances, the idea some years ago occurred of intensifying the action of gravity by employing centrifugal force, and thus effecting the separation of the milk and cream more promptly. So far as we are aware, the first suggestion of this kind was made by Professor C. F. Fuchs, of Carlsbad, who, in 1859, proposed to employ centrifugal force to prove the amount of cream in milk, while in 1864 Mr. Brandtl, a brewer of Munich, applied centrifugal force to the skimming of milk on a largescale. The results of his experiments, however, were not published.

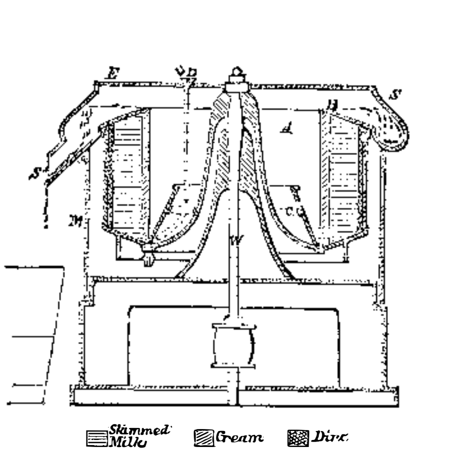

FIG. 2.—CENTRIFUGAL MILK-SKIMMING MACHINE.

Later on, Messrs. Lefeldt and Leutsch, engineers of Schöeningen (Germany), produced a practical machine for skimming milk by centrifugal action. This machine was recently patented in this country through the Scientific American Patent Agency.

Our engravings represent the machine as made by Mr. F. Wannieck, of Brünn, Austria. A is the drum of a centrifugal machine containing the milk to be treated, this drum being provided with a couple of internal paddles which insure the milk being carried round at the same speed as the drum. At the top the drum is partially closed by the cover, B, while within is a conical diaphragm, C, which reaches nearly to the bottom of the drum, as shown. A funnel, D, dips into the drum within the conical diaphragm, this funnel boing supported by the cover, E, which does revolve, it being carried by the external casing, M, of the machine.

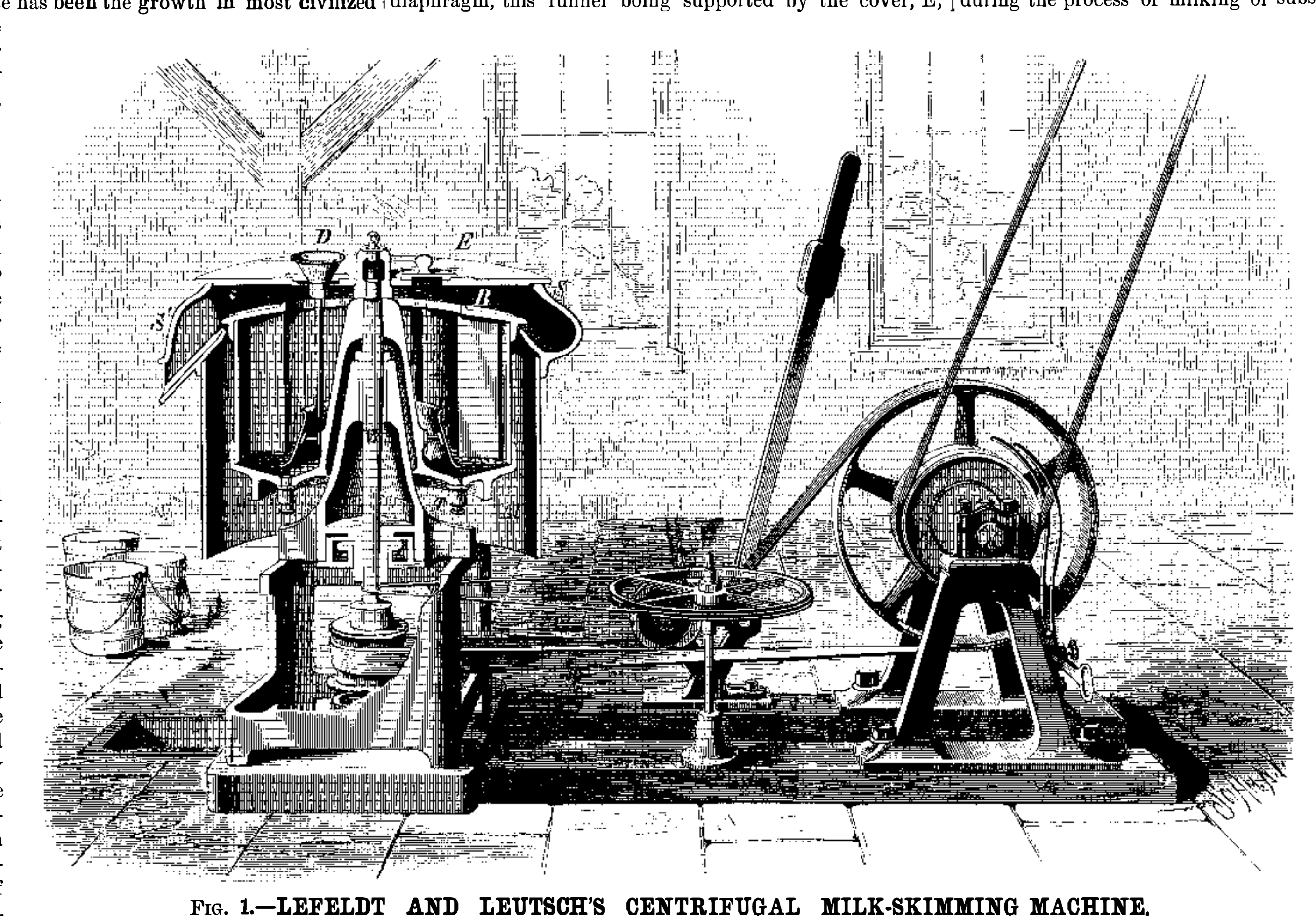

FIG. 1.—LEFELDT AND LEUTSCH'S CENTRIFUGAL MILK-SKIMMING MACHINE.

The vertical shaft of the drum runs in two bearings, as shown by the section, Fig. 2. It will be seen that the external case carries at its top an annular trough, S, this trough being furnished at one side with a discharge spout, S'. The revolving drum is furnished at the bottom with discharge cocks, T'. The mode of driving the drum will be readily understood from the engraving. The base of the machine is connected to a couple of pieces of timber which carry the standards for supporting a short horizontal countershaft provided with fast and loose pulleys, and a larger pulley from which a twisted belt is led off to the pulley on the vertical shaft of the revolving drum. The speed given to the latter is 1,000 revolutions per minute, and the belt driving it passes under a tightening pulley adjusted by the lever shown, this tightening pulley enabling the drum to be started gradually. A light belt on the vertical shaft of the drum gives motion to a revolution counter as shown.

The mode of using the apparatus is as follows: The drum having been charged with milk is set in motion, and as the speed increases the milk rises at the sides of the drum, and eventually assumes the position indicated in Fig. 2. In this position the particles of the milk will evidently, under the influence of the centrifugal force to which they are subjected, have a tendency to arrange themselves in layers in the order of their specific gravity, the heavier particles moving outward, while the light or fatty particles collect on the inner surface of the liquid column. The action of the centrifugal force being much more energetic than the ordinary action of gravity, this separation of the different particles of milk takes place very much more rapidly than when milk is allowed to stand in the usual way, and after the drum has been running at from 800 to 1,000 revolutions per minute for from 25 to 30 minutes, the cream is found to have collected on the inner surface, as indicated in Fig. 2, while all dirt in the milk has been thrown outward against the side of the revolving drum

The next operation is to remove from the revolving drum the cream thus collected. This is effected as follows: It will be noticed that the amount of the charge of milk is such that when it is, by the action of the centrifugal force, thrown into the form of an annular column, the inner circumference of the column is just level with the inner circumference of the partial cover, B, of the drum. To remove the cream some milk—generally skim milk—is poured down the funnel, D, and falling within the conical diaphragm, C, passes under the lower edge of the latter, as indicated in Fig. 2. The milk so introduced passes into the charge without disturbing the layer of cream, and the latter being displaced inward, flows over the inner edge of the annular cover, B, and escapes into the trough, S, from which it is discharged into suitable vessels through the spout, S'. The cream having been thus collected, the machine is stopped, and the skimmed milk run off through the cock, T.

With two machines containing 11 gallons each, 250 gallons of milk can be effectively skimmed in a day of ten hours, while the operation requires no skilled labor and but very ordinary care. Owing to the short time required, also, all chance of the milk turning sour is avoided, and the butter made from the cream is considered of first rate quality. Another advantage of this system, which was not at first counted upon, lies in its thoroughly separating from the milk all dirt which may have become mixed with it either during the process of milking or subsequently. This dirt, which collects as indicated in Fig. 2, smells badly, and an astonishing amount of it is separated by the centrifugal action even from milk which has been carefully filtered through hair cloth, thus showing that the hair cloth filters usually relied upon are far from being thoroughly efficient.

Spontaneous Ignition.

E. Bing, of Riga, Switzerland, has experimented with different materials: wadding, raw flax, hemp, the waste from silk, wool, and cotton spinnings, as well as sponge, and finally wood dust as found in any cabinetmaker's shop. They were saturated with various fluids, namely, oils, fresh and in a gummy state; turpentine, petroleum, various varnishes, etc. All the fibrous materials took fire when saturated with any of these oils or with mixtures of the same. Sponge and wood dust, on the contrary, proved to be entirely harmless.

Combustion ensues, with 17 grains of wadding and 67 grains of a strong oil varnish, in thirty-four minutes; while 200 grains of washed cotton waste, of which a portion was saturated with 750 grains of strong oil varnish, and the remainder wrapped about it, required almost fourteen hours. These materials were placed in a well sheltered spot, and subjected to a heat of from 40° to 65° Fah. Silk did not flame up, but slowly charred.