This process is available and practicable for all milkmen. The milk should be cool in all cases before carting it. Milk that is not cooled commences decay in a few hours after milking, and is not a healthy diet. Sour milk is not so injurious. It is milk that is in a state of change that is unhealthy.

No food should be eaten while a chemical change is going on among its constituents.

The plan suggestion, then, is to have milk cooled before it is offered for sale. Milk in the evening and peddle it in the morning, and sell the morning's milk in the afternoon.

In this manner the territory around our large towns and cities for producing milk will be greatly enlarged, and milk may become an important article of food.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The regular weekly meeting of the Association was held at their room at the Cooper Institute on Thursday evening, Sept. 25th, Dr. Stevens in the chair, and Mr. Stevens acting as Secretary *pro tem*. After a long discussion of miscellaneous matters, the Association took up the regular subject of the evening—

FUEL IN THE ARTS.

Prof. SEELY—The cost of power, of iron, and of many of our most important materials is almost exactly measured and controlled by the cost of fuel. Indeed the cost of fuel is an element in the cost of everything we manufacture. Now the fact that in our very best regulated plans of using fuel we seldom realize more than one-twentieth of its actual value, and in our ordinary operations not one-hundreth, shows how much improvement is to be desired and to be striven for. These truths are well known, and the question of fuel is discussed everywhere. In our club it is quite threadbare, so that I need to make the explanation that I introduced it only to bring out opinions on the new system of using fuel illustrated by Siemens's Regenerator Furnace, and the new material for fuel, rock oil. (A brief description of Sieman's invention was here given). In this furnace it is to be observed that the coal produces no more heat than in other furnaces where the combustion is equally perfect. Also by the use of water and the water gases (hydrogen and carbonic oxide) the total heat is not increased; the coal is, in effect, partly converted into water gases, which burn and give the heat which otherwise would come directly from the coal. Coal and water are fed at the stoking place, and the solid coal and liquid water expand into the combustible gases carbureted hydrogen, hydrogen and carbonic oxide and pass on to the spot where they are to be completely burnt. The advantage of this transportation of the coal lies in the fact that the burning of the gaseous products can be more easily controlled, the heat can be more directly and completely arried to the point where it is useful. The novelty of Sieman's furnace is, however, his regenerator, by which the heat from the otherwise waste products is preserved and brought again to the working point. It is also evident that this waste heat of the regenerator is so added to that of the gaseous fuel that the intensity of the working heat is greatly increased, a fact of great consequence in many industrial operations.

With reference to rock oil I will only remark that although its cost by weight must always be much greater than that of coal, yet for many purposes it will be much cheaper for the reason that the heat it gives can be more completely utilized. Although it costs 50 times more than coal, yet if it does 51 times more work, it is plain that it is cheaper. Later in the discussion I will present some new methods of burning it.

Mr. FISHER—I have made here on the blackboard a rough sketch of the apparatus invented by Mr. Clark for burning the smoke in locomotives in which bituminous coal is used. A number of small openings—usually 14—are made into the furnace, and small jets of steam are blown through these openings, carrying currents of air with them. This air mingles with the gaseous products of combustion, and burns them. It was found that this plan worked very well on locomotives where steam is usually carried at a pressure of 100 lbs. or more to the inch, but when the attempt was made to apply it to marine engines where the pressure is only 30 lbs. to the inch it did not answer so well; there was too much steam in proportion to the air. Even in the locomotive engine the steam must tend to reduce the temperature, as it enters the firebox at some 300° while the burning gases are not less, probably, than 2,500°.

It has occurred to me that the vapor of petroleum might be blown into the furnace in place of steam, and thus the heat might be considerably increased. A separate boiler might be used for evaporating the petroleum, and the jets arranged in the manner adopted by Mr. Clark. Where petroleum is to be employed as fuel, I suggest this as a good plan for using it.

Prof. SEELY—I would ask Mr. Fisher what he expects to gain by this arrangement.

Mr. FISHER—I expect to avoid the reduction of temperature which results from the use of steam. I suppose the combustion of the smoke will be quite as perfect—or perhaps more so—and that the heat will be greater. It is known that the temperature in the boiler flues is much lower than in the fire box. Experiments have shown that a foot of heating surface in the flues is worth only about a third as much as the same surface in the firebox. If a higher heat can be imparted to the gaseous products of combustion before they enter the flues, a larger quantity of steam can be generated.

Mr. DIBBEN—I think that Mr. Fisher is right and that his explanation might be made more full. If the temperature of combustible gases, however thoroughly they may be mixed with air or even with pure oxygen gas, is reduced below the burning point, combustion ceases. It has accordingly been found that the old plan of lining fireboxes with fire brick is better than leaving the iron walls exposed. Whenever the gases come in contact with the comparatiuely cold iron they cease to burn. Anything, therefore, which tends to reduce the temperature in the firebox, tends to prevent a perfect combustion.

(The speaker then made a drawing on the blackboard and described Siemens's gas furnace, the same that was explained so fully by Professor Faraday in his lecture, an abstract of which was published on page 148 of our current volume.) Mr. Dibben concluded by expressing an opinion of the very great value of this invention, saying that Mr. Siemens deserved the highest credit for pushing it through to practical success; and that it was satisfactory to learn that this inventor is at least enjoying a reward for his inventions.

Prof. SEELY—I indorse what Mr. Dibben has said in relation to the value of Mr. Siemens's furnace, and I have no doubt that it will come into very extensive use throughout the civilized world. I regard it as a very great invention.

The same subject was continued for the next Thursday evening, and the Association adjourned.

SORGHUM AND IMPHEE CULTURE.

From the able treatise on sorghum culture and sugar making by Isaac A. Hedges, published in the agricultural volume of the Patent Office Reports for 1861, we take the following extracts:—

THE TWO VARIETIES OF CANE.

There are really but two varieties of the sugar-cane, commonly called Sorghum, in cultivation in the northern States of this Union, viz., the Chinese and the African. Although of the latter variety, introduced by Mr. Leonard Wray, of England, there were originally several sub-varieties, they are now fast becoming merged into each other, and their various shades of difference are becoming obliterated by hybridization, consequent on contiguous cultivation.

Since the first introduction of these plants into the United States I have been a careful observer of their habits and tendencies, with a view to arriving at a proper estimate of their relative values. As a result of these observations, I shall here state what I conceive to be the chief differences between the two varieties, in a practical sense; that is to say, those differences which render one or other preferable as an article of cultivation to the sugar or sirup manufacturer. The Chinese cane seems more closely related to broom corn than the African, and manifests a greater tendency to "crossing" and deterioration from contiguous crops of the broom; it is also very liable to be thrown down by the winds, and to the production of large, gummy joints, which exercise a detrimental influence on the production of either sirup or sugar. The plant, too, when thrown down by winds or rain, in its efforts to regain the upright position becomes so crooked as to give great trouble to the workmen employed in handling the stalks. The African variety or *imphee*, on the contrary, is much more vigorous in the stalk, and seldom falls before the wind; its joints are much smaller relatively to the size of the stalk, and its juices are more limpid and rich, generally showing about one degree richer in sugar, by the saccharometer, than the juice of the Chinese cane. Upon a deep, rich soil I have generally found the Chinese cane to be rank in growth, and yielding juice of inferior quality, which is difficult of defecation. Upon a similar soil, however, the African cane (several lots of which I have worked during the last fall) yields a uniform crop of large plants, which, although not perhaps as sweet as those grown on poorer soil, yield in the aggregate more sugar or sirup to the acre. Upon the whole, therefore, it will be perceived I give a decided preference to the African cane or *imphee*.

WILL THE SORGHUM SUPERSEDE THE BEET?

It has been supposed by many that the introduction of these sugar canes into France would lead to the abandonment of the cultivation of the sugar beet in that country; but from a letter I have received from a well known house in Paris, it would appear that no expectations may be entertained that the cane will supersede the beet.

THE MODE OF PREPARING THE SEED.

For preparing seed I would recommend the use of a simple revolving cylindrical hackle, such as is used for cleaning the broom seed from the wisp; this will not fully prepare the seed for planting, but will make it ready to be freed from the twigs or clusters which adhere, so that greater uniformity in planting may be attained. For this latter purpose I use a machine consisting of two vertical wooden plates, one of which is stationary, and provided with an opening in the back, communicating with a hopper, and the other revolving by means of a crank turned by hand. The revolving plate is held up against the stationary one by a spring of just sufficient strength to cause the seed to roll between without injuring it, and thus separating all the twigs and much of the hull. This separation of the hull from the seed of the *imphee* is rather a benefit than otherwise, as it enables the moisture of the earth to penetrate sooner, and thus hastens germination.

PLANTING THE SEED.

I would specially caution farmers against planting seed without first having tested its capability of germination; then, having satisfied themselves on that point, let care be taken not to plant too thickly. If planted in rows, they should be fully four feet apart; and if planted in drills, about four or six inches between each seed. A reliable planter will pay his extra cost in the end; but, however planted, and by whomsoever, I repeat, plant shallow—not exceeding one inch deep, and half of that depth would be still better.

Plant as early as the ground, by being dry and warm, seems fitted for the seed, and then plant shallow—very shallow.

The seed should, previous to planting, be soaked in warm water until an appearance of germination is perceived. This in the *imphee* will require about two days; in the sorghum, nearly six.

CULTIVATION.

The young cane plant is exceedingly diminutive, and is hardly distinguishable from the fox tail or summer grass; hence the importance of having clean ground wherever practicable. The plants require no other or greater attention in the way of hoeing or dressing than is bestowed upon Indian corn or broom corn. In some soils the cane is liable to "tiller," or, as it is sometimes called, "sucker." It will therefore be advisable to remove the young suckers, in order to permit the main plants to mature uniformly and vigorously, and also to facilitate the stripping and gathering.

CUTTING AND HANDLING.

As has already been intimated, in reference to the time for planting, the time for commencing cutting depends greatly on the season, varying as the weather has been more or less favorable for maturing the plant. Of one thing we are, however, certain, viz.,