majority of cases in enabling the patient to take the oil, even though it previously disagreed; (2) that in some cases in which the oil still disagrees after the addition of the ether, the difficulty may be overcome by giving the ether separately from fifteen minutes to half an hour after the oil is taken. No facts were laid before the committee from which they could judge as to whether the etherized oil is superior to the plain oil in its ultimate effect upon nutrition, supposing them to be equally well tolerated by the stomach.

A FEW NOVELTIES.

The accompanying engraving represents several simple inventions recently patented in the United States. Most of them are of the class that sell for a few cents—a class of inventions that are, as a rule, more profitable than any other.

Fig. 1 shows an improved candlestick invented by Mr. John Frick, of New York city. It is composed of three parts, two of which cross each other and form the base and support for the candle; the third, the disk, is slotted radially to receive the crosspieces, and has a turned-up edge for retaining any tallow that may drip from the candle.

A can opener is shown in Fig. 2; the knife used in it in Fig. 3. This instrument consists of a frame which receives the top of the can, having attached to it a handle and carrying the small knife, which cuts the cover as the opener is turned on the top of the can. Mr. T. F. Wilson, of Washington, D. C., is the inventor of this device.

A fountain mucilage brush, the invention of Mr. J. B. Davids, of New York city, is shown in Fig. 4. It consists of a brush adapted to a bottle, and provided with a tubular handle, having on its upper end an elastic bulb for containing mucilage or any other liquid to be applied with the brush. By compressing the elastic bulb and dipping the brush in the liquid and then allowing it to expand, the liquid is drawn into the bulb through the hollow brush handle, a small hole being provided near the lower end of the handle to admit the liquid.

The improved weighing scoop shown in Figs. 5 and 6 was recently patented by Mr. John Berks, of Ogdensburg, N. Y. It has a spring balance in the handle, and is graduated so that it may be used for measuring as well as weighing.

An improved nozzle for holding dies in the process of hardening is shown in Fig. 7. It is the invention of Mr. Joseph B. Harmstead, of San Francisco, Cal. It is especially designed for use in mints. The face of the die is hardened first, the back being protected by the inwardly projecting rim.

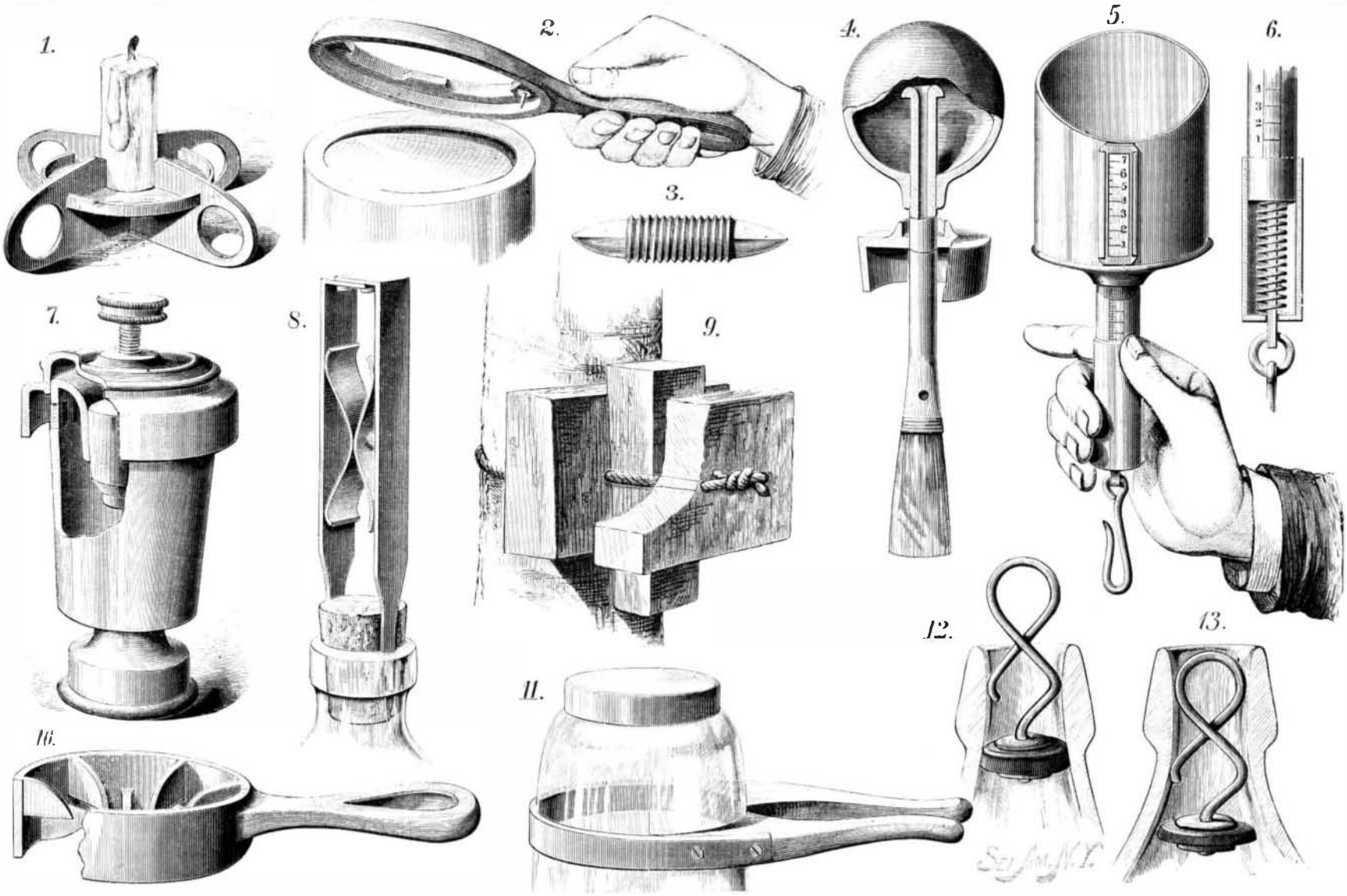
Mr. L. C. Mumford, of San Francisco, Cal., has devised a cork extractor, shown in Fig. 8. It is made wholly of spring sheet metal. Its construction, as well as the manner of using, will be readily understood by reference to the engraving.

Mr. Ezra A. Quinby, of Memory, Iowa, the inventor of the tree compress shown in Fig. 9, claims that by applying the compress so as to prevent the return of the sap to the roots the limbs will mature much earlier than they otherwise would, and will bear fruit earlier and in greater quantities.

Fig. 10 shows a hand corn sheller invented by Mr. George W. Grimes, of Bluffton, Ind. It consists in a ring, provided with two or more rows of inwardly projecting teeth, and having a handle by which it is manipulated. The sheller is held by one hand, and the ear of corn is thrust into it and turned with the other hand.

A simple and effective wrench for holding fruit jars while the cover is applied or removed, is shown in Fig. 11. It is the invention of Messrs. D. Sherman and G. D. Dudley, of Lowell, Mass., and it consists of two handles connected by a band which passes around the jar. The inventors prefer to use wood in its manufacture and to make it entirely of one piece.

The bottle stopper shown in Figs. 12 and 13 is the invention of Mr. C. G. Hutchinson, of Chicago, Ill. It consists of a wire loop of peculiar form, having attached to it a rubber disk which acts as the stopper. Fig. 12 shows the bottle stopped; Fig. 13 shows it open.



RECENTLY PATENTED NOVELTIES.

The Discipline of Education.

A great deal that is said about the importance of classical education as a discipline of the mind largely disregards the operation of ordinary duties in this direction. We can imagine that a young nobleman, so situated as to be above or beyond those compulsory circumstances that force the average man to exertion, would without the discipline of a college education fall into very loose and idle mental habits. College training is with him the only thing that will teach him to govern his desires, to concentrate his attention, and to bring his mind under the control of his will. Without the obligations and stimulus of college life he would be likely to develop into a very slothful and self-indulgent maturity, with little command over his faculties and little inclination to exercise them. It is this fact, we apprehend, that lies at the root of nearly all the utterances that we hear upon the subject—utterances that are for the most part traditional, that are borrowed from the higher ranks of English life, and which are derived from observations purely special and local in their character. They apply with equal force to a small proportion of our own people, it being evident that young men of wealth would sink into marked inferiority if educational discipline did not extend well into their manhood. But we are convinced that the requirements of the schools, the mental training which comes of a study of the ancient languages and the higher mathematics, are far from being so completely disciplinary as the ordinary experiences of the professions and the trades. The lawyer in his practice soon gains the power of concentration, and is fairly compelled to bring his mind under the control of his will, his discipline being more thorough, more exacting, more sustained, than any that can be invented by college systems. The daily experience of the physician is likewise efficient in bringing all the functions of the mind into subordination and under control. It is only by sustained effort and severe concentration that the man of letters can succeed; the painter and the poet are helpless if their intellectual powers are not fully at their command. It will be said here that the exact purpose of college discipline is to prepare men for these exacting duties. But in our observation training at college bears so small a proportion to that which comes with the competitions of life that it is scarcely traceable We have always found that men whose necessities force them to bend their energies to work are the men who hold themselves well in hand, and that other men usually have little power of application; that is, the classification does not distinguish between educated and uneducated men, but between working and non-working men. In the list of men who have attained success or contributed notably to the world's advance, it will not be found that those who have exhibited remarkable mental power and intellectual self-command are specially on the side of the university class. Three of the most conspicuous men in English philosophy and science—Herbert Spencer, Huxley, and Tyndall—have developed their remarkable powers from the impulses of their natural gifts and not by the aid of college discipline or classical guiding. Perhaps their labors would have been easier under a thorough preparatory course—this is not easy to gainsay—but the fact remains that in the pursuit of their several ends they have brought their mental forces under complete and perfect control. Necessity is the great master, and it operates on all classes of society—it gives the power of concentration to the lawyer, teaches the physician to be self-contained and studious, gives efficiency to the pen of the writer, drills the bookkeeper and the clerk, and trains the hand of the artisan. It is an ever-present and most exacting schoolmaster; and, as with an immense majority of people this schoolmaster begins his lessons in youth by means of the struggles and burdens of life, and continues them without relaxation to the end, the discipline within certain limits is complete—the self-control being general, but the proficiency lying, in each case, solely along the line of experience. —*Appletons' Journal.*

The Formation of Character.

There is a practical as well as a scientific basis for the position taken by the Rev. Phillips Brooks in a recent discourse in this city, namely, that the law of evolution rules in the moral as well as in the physical world. Nature does not create, but is always developing. In last summer's roots nature finds the germ for next summer's verdure.

"If somebody should give me a diamond to carry to Europe, I can know exactly how much would be lost to the world were I to drop it into the sea; but if a seed should be given me, I can only regard it with awe as containing concealed within it the food of untold generations. That is the difference between looking at truth as a diamond or as a seed —as final or germinal.

"In all training of character, continuity and economy must be supreme. The notion that character is spontaneous is held by most people in the earlier portion of their lives, and is wrong. When they discover this, nine tenths change to the other extreme. This is wrong too. Hosts of young men think that their character will form of itself and that they will necessarily become better as they grow older. Hosts of old men believe that their character is fixed and that it is impossible for them to become better. Such beliefs are foolish. People are also wrong in thinking that they can put off their bad traits and put on good traits. The old failures cannot

be thus transformed, but out of the old habits new can be formed. This is what many a poor creature needs to know. We must make what we are to be out of what we are already."

Machinery in America.

In our leading remarks last month we endeavored to show the important part which machinery may be made to perform in enabling us to oust all competitors from our own markets, and in enabling us to make a profit and still undersell in countries where protective duties have been increased on the importation of English manufactured goods.

Our remarks have met with some attention from some of our most deservedly distinguished men, and the question at issue has chiefly turned on the patent laws. Are cheap patents good for the trade of the country? Lord Selborne says "No." We say "Yes."

The United States of America already possesses cheap patent laws, the cost of obtaining a complete patent there only amounting to £13 and upward, against £190 in this country at the present time, and it is therefore a fair argument to consider what advantages these laws give to the manufacturers in the States. Taking this standpoint, we assert at once that their power to compete where they now do with English makers is traceable to the perfection of their machinery, and that they owe their perfect machinery to the stimulus given to ingenuity by their cheap patent system.

We must remember that the manufacturers in the States have to pay dearer for their coal, their iron, and their labor than their English competitors; they are further handicapped by heavy protective duties; and we ask, therefore, what is the explanation of their advantage over us? How is it possible for them to undersell us in any one item if we have such essential advantages to start with? Let us hear what Mr. Thomas Brassey, M.P., has to say about it. Lecturing in January, 1878, on the comparative efficiency of English and foreign labor, he urged that we have much more to fear from the highly paid labor of America, *which brought labor-saving machinery and mechanical skill to such a high degree of perfection* [the italics are ours] than from the lower wages of the Continent of Europe. Referring to the success with which the Americans have competed with us in the making of small arms and locomotives, he says:

"It would at first sight seem incredible that our engine builders should have been beaten in a neutral market with no hostile tariff. Anyhow, it would have been expected that, if we were beaten, it would have been by the Belgian or German makers, who command an ample supply of labor at comparatively low rates. The contrary, however, has happened, and it is a country where labor is paid at rates unknown in the Old World which has supplanted us. We have been conquered by the mechanical skill of the employer in devising labor-saving machinery, and by the industry and energy of the workmen, who, if they have earned high wages, have worked longer and more industriously than many among our own mechanics have been disposed to do."

The above remarks were quoted in a paper by Mr. A. J. Mundella, M.P., read before the Statistical Society, February 19, 1878. The paper dealt with the question, "What are the Conditions on which the Commercial and Manufacturing Supremacy of Great Britain depends?" Mr. Mundella used Mr. Brassey's remarks to show that American skilled labor is equal to English. We think, however, that it has a great significance in connection with the cheap patent system, as that alone accounts to us for the stimulus to Americans to be always inventing and producing the perfected labor-saving machinery which Mr. Brassey speaks of.

In further considering the comparative efficiency of English and American labor, Mr. Mundella himself incidentally touches on the importance of the machinery. He says:

"The American under equal conditions will produce nearly, though not quite, as much as the Englishman. Wherever I have found him producing more it was due to his having been furnished with better machinery and appliances to work with."

In the discussion on Mr. Mundella's paper, Mr. J. B. Brown, who stated that he had given a great deal of attention to the question of the comparative efficiency of American and English labor, said:

"Everywhere he went in America he found the manufacturers were in favor of protective duties. A large number of the most intelligent of them said they would willingly yield a great portion of the tariff at once, because the American workmen and the improved American machinery could hold themselves against the world. . . . From his own experience, he found that the American machinery on the whole was superior to the English, quite as well made, generally more ingenious, and more successful in saving manual labor."

Another speaker (Mr. H. D. Pochin), said:

"There was a time when our workmen were equal to any workmen in the world; but any one acquainted with the facts would know that in certain classes of machinery we were outdone by the Americans, not because they had greater skill than our own workmen, but because of the spirit that was abroad among them, and the doctrines that were being instilled into them."

The foregoing testimony to the efficiency of American machinery is all the more valuable for our purpose because of its incidental character. We find our point further supported in an article which appeared in the *Fortnightly Review* for March, entitled "An American View of American Competition." In it, the writer, after referring to the small army required by the United States of America, and the room for immigration, says:

"If there is any force in this reasoning, our competition with other manufacturing countries in supplying neutral markets with manufactured goods will not be compassed by low rates of wages paid to our factory operatives, or to the working people engaged in our metal works and other occupations, but first, by obtaining and keeping such an advanced position in the application and use of improved tools and machinery as shall make high wages consistent with a low cost of production."

We think the evidence we have quoted clearly establishes this one fact that, although paying higher wages, and paying more for materials, the manufacturers of the States are able to compete in neutral markets with certain classes of goods, simply and entirely owing to having better, *i. e.*, more productive or more economical labor-saving machinery than we have in this country.

Now we come back to inquire how it is that the Americans have better devised machinery than we have. The answer we have to this serious question is contained in a simple remark made to us once by an intelligent workman, who had been in the United States: "You see, in America you can get a patent for £10 or so, and every one thinks how he can invent something."

The future manufacturing and commercial supremacy of this country depends to a greater extent than will ever be imagined by a superficial observer, on our keeping ahead in the excellence of our machinery and appliances. We have seen how the superiority of the American machinery enables the masters to pay high wages for skilled labor. Why should not England and English workmen have the same benefit? The remedy lies in our own hands. Let us, for the sake of trade, meet America on its own ground, and practically free ingenuity from taxation. Let there be no greater cost for protecting inventions than is readily payable by any saving workman. Let the people agitate for cheap patents, so that the humblest inventor may be able to protect his invention and recoup himself for serving his country, and we venture to predict that our machinery and appliances will be so perfected that no country will be able to compete with us in a single article worth mentioning, and so the trade of the world will flow unreservedly into our hands. —*The Machinery Market.*

American Meats in England.—A New Process for Preservation.

The Farm, published in Dublin, Ireland, in discussing the subject of importing live cattle into the British Islands, says: The carrying of live cattle over great distances by sea is surrounded with difficulties, which may, no doubt, be overcome, but which cannot be done away with entirely, and, so far as our present experience has gone, it seems certain that the necessities of these islands will, more and more, require to be supplied by improvements in the processes for the collecting abroad and for the carrying of dead meat.

Alluding to the present traffic the writer says: For some time past American beef and mutton have been largely imported into this country. In Liverpool alone, frequently there arrive in one week consignments amounting to over 5,000 quarters of beef, 1,500 carcasses of mutton, and 1,000 pigs. When the carrying of dead meat first commenced endeavors were made to preserve it by freezing it while quite fresh and keeping it frozen until the time when it was to be used. This, however, turned out very unsatisfactorily. First, it was very difficult to freeze the meat and to keep it uniformly frozen for a great length of time—ten days or more; and in the next place, it was very soon found that meat which has been frozen undergoes decompositon with extraordinary rapidity as soon as it is thawed. No doubt, the cellular texture is broken up by the freezing process in such a way as to favor decomposition if once commenced.

A great improvement on the "freezing process" was introduced two or three years ago. The animals are slaughtered under the best conditions as to health and cleanliness. The carcasses, having been quickly cleaned, cut up, and covered with a loose pack sheet, are hung in a chamber which is kept cooled with dry air, at a temperature not so low as that of freezing, but at about 35° Fah., which is three degrees above the freezing point. Until now this has been effected by supplying the meat chambers with air that has been passed backward and forward through tubes which are cooled in a chamber packed with ice. A steam engine forces or draws air through these tubes, and throws it into the meat chambers. In passing through the tubes the air is thoroughly cooled, and the moisture which it possesses is at the same time removed, condensing in the tubes and being allowed to run away. When it enters the slightly warmer meat chambers it is both sufficiently cold to keep down their temperature, and sufficiently deprived of moisture to be comparatively dry.

The carrying of meat by this process has been most successful. Not a cargo has been lost, we believe. It is necessary to carry a spare supply of ice to provide against accidental delays. The extra ice can, however, be sold at a fair price, though ice machines in this country have made foreign ice much less valuable.

Very recently a machine has been constructed in Glasgow, at the Finnieston Engineering Works, and has been tested with the most satisfactory results. A large chamber in which dead meat was suspended was kept at a temperature of about 35° for several weeks at a time in the autumn of 1878. At the end of the time the meat proved to be perfectly sound and good; and it remained so after being taken out of the cooling chamber and kept for several days. Subsequently an experiment was commenced in which the chamber was maintained for a long period, about three months, at a temperature close to the freezing point, with the hope of being able to import dead meat from Australia and New Zealand. These experiments are still being carried on, with results which, up to the present time, are quite satisfactory. It is the invention of a Mr. Coleman.

The principles of the machine may be briefly explained. When air is compressed it becomes heated. This is very commonly shown, as an experiment, by means of an air syringe, in which the ordinary exit is closed with a stop cock. When the piston is suddenly forced into the barrel by a blow, the air contained within the barrel becomes compressed, and is heated to so high a temperature that a bit of German tinder placed within the barrel can easily be set on fire. Conversely, if a quantity of highly compressed air is allowed to expand, doing work against pressure in expanding, it becomes cooled. Mr. Coleman's machine depends for its action on these principles. Its object is to obtain a large quantity of highly compressed dry air at a low temperature; to allow the air to expand, not merely rushing off through a stop cock, but to expand doing work such as is done by steam in a steam engine—under which circumstances the air becomes cooled in proportion to the work it does; and, finally, to throw this cooled air into the meat chambers.

For this purpose, air, at ordinary pressure and temperature, is drawn into a set of cylinders, and then compressed suddenly. During the compression a great amount of heat is developed, and this has now to be got rid of. Accordingly, water is injected in spray into the compressing cylinders, and the compressed air is cooled down to the temperature of the coldest water.

The next process is to remove the water, and at the same time to cool down the compressed air still further before the expansion is proceeded with; and a part of this process is most ingenious, and most interesting from a scientific point of view. First, the air is thrown against a set of disks perforated with very fine holes, and in passing through this fine grating, a large proportion of the water which is held up by the air in very minute globules is then taken from it, and is allowed to run away through cleverly devised valves; but, further, the air, still at high pressure it will be remembered, is conducted up by slanting zigzag pipes through the meat chamber and brought back. Now, the meat chamber is at a very cold temperature, and the air in being carried through it is being reduced down to the temperature of the chamber, and it is then brought back to the engine to be still further cooled in expanding from its compressed state. In this lies one of the great theoretical interests of the process; for it will be noticed that there is no limit, except the practical one of construction, to the cooling effect to be obtained. Let one cooling machine be connected with another, and a third with the first mentioned, and so on, each one working from the cooled chamber of the one that precedes it in order, and the cooling can be carried on indefinitely. We should, of course, be met by difficulties as to conduction of heat by the materials used, and as to loss of chilled air by leakage, but the conception is highly interesting.

The passage of the compressed air through the chilled zigzag pipes has another important use. Any moisture still contained by the compressed air is condensed, and trickles back through the tubes which are slanting upwards. It is collected at the bottom, and passes away through proper valves.

The very cold dry air, at high pressure, is now brought back to the engine which drives the whole machine. This engine is an ingenious compound engine. It is worked partly by steam and partly by the highly compressed air. The steam piston and the air piston are both connected to the movable parts of the engine, and each does a portion of the whole work. The cylinders for steam and air are, of course, quite distinct. The part of the engine driven by steam we need not refer to; it is with the expansion of the air that we are concerned here. It is allowed to enter the cylinder at high pressure; doing so, it forces the piston before it, expanding and doing work. When, by expanding, it has come down to atmospheric pressure, it is intensely cold, and it is then allowed to escape from the cylinder through proper valves during the back stroke of the engine. It is passed forward by tubes, which are covered with felt, or some non-conducting material, to prevent loss of cold, and allowed to enter the meat chamber.

There are a great many beautiful and ingenious details in the construction of the machine to which it is impossible to refer in this notice. Among the practical difficulties that arose in the working of it was the lubrication of the air part of the engine. All the oils tried became frozen and clogged the moving parts. The lubrication is now effected with glycerine, which does not freeze.

DISCUSSING the causes of the depression in English trade, the *Pall Mall Gazette* remarks that the substitution of steel for iron by the Bessemer process, and still more by the elimination of phosphorus from the Cleveland ores (now positively accomplished) is a revolution as great as followed upon the inventions of Crompton and Arkwright. It means, most probably, the total decay of the iron trade of North and South Wales, of Scotland, and of a large part of Staffordshire. In the end it will largely benefit England, but the transition is full of suffering.