Of Cider.

will not be deemed improper, and may possibly lead to some improvement in this subject so important to many farmers.

In the first place, the mill is not perfectly cleaned, previously to grinding the apples; next the apples are picked green, ripe, and rotten, as it may happen, and together with a quantity of grass and leaves, are all ground up; and lastly, the liquor without straining, (and consequently with a good deal of pomage in it,) is put into dirty casks, the bung being loosely stopped with straw, and rolled away into the cellar, where no further attention is thought necessary until the cider is wanted for use; when, in consequence of this very improper mode of treatment, it is found perfectly sour.

English writers on this subject, give a great many directions, but as they all require more labour than we can command, and are of little use in this country; the time for making keeping cider, occurring in one of the busiest seasons of the year.

What however may be usefully mentioned, and agrees with our own experience, are the following general directions:

That the apples should be as nearly as possible of an equal degree of ripeness, and if not perfectly ripe when gathered, should be put in a heap for a few days to mellow,* when ground, care should be taken

* Apples should be housed to keep them from rain; and the whole process of cider making carried on under cover.

2 P
that every thing be perfectly clean, and the straw used
in making the cheese, should be free from must, or
any disagreeable smell which might be imparted to the
cider.

The pomage should remain from twelve to twenty-
four hours after grinding, before it is pressed; the
cider must be carefully strained and put into clean
casks, avoiding new ones, unless made of perfectly
seasoned wood, or such as have had any liquid in them
which might flavour the cider. Here may be found
the grand stumbling block of most farmers.

When a cask of cider is run out, there will generally
be left a few gallons of lees: the bung and spicket
hole are left open, and in this situation it frequently
remains until the next cider season, when, after a few
scaldings, which are of little effect, it is filled with
fresh cider; the inevitable consequence is, the cider
will become sour. To avoid this, so soon as a cask
is out it should be completely emptied, and scalded
perfectly clean, or well washed with lime water, dried
and bunged up close; it will be then found sweet
when wanted.

Much has been said in favour of racking off cider
frequently, to prevent acetous fermentation, and though
I am unwilling to differ from the high authorities upon
which it is recommended, as the result of various ex-
periments, yet I cannot but offer a few remarks on the
subject.

When cider is made late in the season, so as to un-
Of Cider.

Degré a slight fermentation, sufficient however to give it an agreeable vinosity, it may become a question, whether by suffering it to remain on the lees, they do not afford a kind of feed, by which it retains its strength and vinosity longer than it otherwise would do?

This however is more particularly applicable to cider for immediate use, it certainly being proper to rack off from the lees, that which is meant for keeping, some time in the month of March, when the weather is too cold for fermentation, to which it is liable upon being agitated.

It is also worthy of attention whether cider, racked off upon the subsiding of the first fermentation, which has been slight, does not immediately undergo another fermentation, (in consequence of the agitation and mixture of the fermentable principle which subsides with the lees,) which although almost imperceptible, in a short time renders the cider sour.

Especial care must be taken to fill the barrel to the very top of the bung hole, at the last racking; that if any light or flying lees remain in the liquor, they may be removed at the bung, for this is frequently the case of mellow cider; and if those lees are permitted to remain in it, the surface, by being exposed to the air, will become sour. That tartness will by degrees render all the cider of the same complexion. Yet, the taint may be perceived to descend gradually; for while the cider is sour at the top, it is sound a few inches below
it, till it descends from top to bottom. This is the grand article in which people are wont to be deceived, and by which they are rendered out of humour, with racking of cider, how much soever they are pleased with it, when it happens to answer their wishes. When their cider turns sour, they imagine that racking takes away the spirit of it, and that it must then become sour of course, for want of a body, as they are wont to speak; whereas in truth, it grows sour for want of skill how to secure it after the last racking, by removing the light lees which swim on the top, before they acquire the last degree of acidity.

The commencement of acidity may be known by a singing or hissing noise; this should be immediately attended to, and probably the most effectual and certain remedy, will be in the addition of a small portion of high proof spirit, and the bunging the cask tight.

Cider put into the cellar so soon as made, generally undergoes too great a fermentation. To prevent this, when it is made late in the season, the cask should be placed in the north side of a house and completely protected from the sun; the warmth of the day disposes the cider to ferment, but the coldness of the night so far checks this disposition, that only a slight yet a complete vinous fermentation takes place.

When however this is completely stopped by the increased coldness of the weather, and before it freezes, the cider should be run off into casks placed in the cellar, with as little agitation as possible, and about one
gallon of brandy added to each hogshead; the casks then being closely bunged, no further fermentation will take place. This change of temperature, is a powerful opponent to fermentation. But strong sweet cider, put into a cellar where there is a constant uniformity of temperature, even though it be very cool will almost certainly ferment, and the fermentative principle once completely in action, can scarcely be stopped, but by a very great increase of cold.

I am well aware, that the ideas here advanced as to the necessity of cleanliness, in every part of the operation, but particularly in the casks, will be *ridiculed* by many; having experienced the fact that very fine cider has been produced where no further pains were taken by the owner, than to order an old negro with two or three boys, "to make the cider," and the casks were probably, only washed with a little cold water. This however might only happen once in half a dozen years, and should be regarded as an accidental concurrence of circumstances, probably beyond the art of man to elucidate. It is an exception to a general rule, and in direct opposition to theory and correct principles; such accidental circumstances, therefore, should not be regarded by the man who wishes to act according to system.

When cider is wanted for making wine or any particular use, the last running from a pressing should be taken, as this will be found more pure and perfectly free from pomage.
Receipt to make Cider.

(Agreeably to the plan practised in Ireland.)

After the apples are bruised and pressed in the usual manner, the juice should be immediately put into large open vessels, and suffered to remain in this situation from twenty-four to forty-eight hours, in order to deposit any crude matter which may have passed through the bag; and also to throw up the lighter particles in the form of scum, which should be carefully removed; the liquor is then to be drawn off and passed through a double flannel bag, removing the ferment matter by occasionally turning and rinsing it. When thus prepared, put two or three gallons into a strong well bound cask, in which matches, (made by dipping linen rags in melted sulphur,) are to be lighted and suspended from the bung hole, by means of iron wire, and the bung lightly put in, fresh portions of match must be added until they cease to burn on their being introduced into the cask, which should now be violently agitated for the purpose of assisting the absorption of sulphurous gas. After standing a quarter of an hour, draw it off into a tub, the cock and bung being left open, that the light unabsorbed gas may be suffered to escape; after remaining in this situation for about fifteen or twenty minutes, the operation must be repeated five or six times, with a like quantity of fresh liquor each time; return the different portions into the cask, and fill it up with filtered liquor; put a quart of spirits to every forty gallons, and insert the bung in the firm-
Of Cider.

...and closest manner, so as to preclude the possibility of the internal air forcing a passage, should it be disposed to ferment. In six months it will be fit for bottling, the corks must be wired down and the bottles laid on the side in binns.

Rationale.

Sulphurous acid, which is formed by burning sulphur in confined portions of atmospheric air, has the well known property of checking fermentation, so that if the fresh juices of fruit be impregnated with this acid, it causes a suspension of the vinous fermentation, until sufficient time is afforded for the forming of the liquor, which on its being bottled, gradually ferments, and causes it to assume that fine sparkling appearance met with in English cider. In the common sour cider, the fermentation has proceeded through the vinous to the acetous, and consequently in a state nearly approaching to vinegar.

In the mode usually practised, in making cider, in imitation of English, the fresh juice is at first put into the cask, and the whole drawn off when it shews signs of fermentation, the casks stoved with sulphur match, and the liquor immediately returned; racking off, and stoving it until it ceases to exhibit a disposition to ferment, which tedious process usually takes about six weeks, but which may be advantageously shortened by the substitution of sulphur matches, in larger proportions as before directed; so as to impregnate the liquor with sulphurous gas.
CHAPTER XIII.

Improvements, or Substitutes, for the common Worm.

MR. ACTON, of Ipswich, in England, having used a still, containing nine gallons, for distilling common water, essential oils, and water, refrigerated them into a tub, containing about thirty-six gallons, found it very inconvenient to change the water of the tub, as often as it became hot, which it very soon did, after commencing distillation; he therefore contrived the following addition to the refrigerating part of the apparatus, which he has found to succeed so well, that he can now distil for any length of time, without heating the water in the worm tub, above one degree; so that it never requires to be changed; the heat passes off entirely into the additional condenser, and when it exceeds 150° goes off by evaporation. The additional condenser consists of a trough, three feet long, twelve inches deep, and fifteen inches wide, with a pewter pipe passing through the middle of it horizontally, about two inches in diameter at the largest end, next the still, and gradually tapering off to about three quarters of an inch at the smallest end, which communicates with the worm. The great simplicity of this contrivance, and its utility, render a fair trial of it in other stills advisable; the small degree of heat, which went to the water in the worm tub shews, that the additional condenser performed nearly the whole of the
condensation, and that therefore it is extremely probable, that a second pipe and trough added to the first, would perform the whole condensation effectually, without using any worm, and thus enable distillers to dispense with this expensive and troublesome part of the apparatus.

Remarks by H. H.

Had Mr. Acton lengthened the worm three feet, increased the size of the worm tub, and added a quantity of water equal to the contents of the trough he used, I think he would have been equally successful. Still, however, it is a matter worthy of attention, and I trust we shall have some satisfactory experiments on the subject before long, as it is a favourite project with several gentlemen of this country. I never thought that the same quantity of water applied in a horizontal trough could be equal to the old plan of a worm, but it would probably be of advantage, to have a horizontal semicircular tube in place of a worm for the wash still, on account of the ease with which it might be cleaned, in case of being choked. The difference of expense is scarcely worthy of consideration; but by placing the troughs out of doors, the room of the worm tub would be gained.

A worm made of semicircular pipes, with the flat side below would cause a greater surface to be exposed to condensation.
Improvements on the common Worm

Another substitute for a Worm.

Procure two of the largest and widest sheets of copper. Let two frames of wood be constructed of such dimensions, that the sheets may be turned over the edges and nailed. Stretch the copper by a mallet, as evenly as possible, so that it may bulge towards the opposite side from where it may be fastened. Clamp the two frames together by screws. By means of two holes at opposite corners, the steam may enter and pass out when condensed.

Another substitute.

M. Lapadius of H’rieburg, has discovered a method of condensing vapours in distillation, more rapidly than has yet been done. This is accomplished by means of a diak, attached to the tube of the still, which has the figure of a lens, flattened as much as possible, and is made of copper. It produces a much better effect than the worm hitherto employed for that purpose.

Description of Baron de Gedda’s Condenser.

(See Rep. of Arts, vol. 21, New Series.)

This condenser consists of two cones, obturcated and reversed, placed one within the other, leaving between them an interval closed at top and bottom by rings soldered to the cones. It is in this space, which is three times larger above than below, that the condensation of the alcoholic vapour is effected. The interior cone being truncated, lets the water of the refri-
gerator pass, which striking the interior and exterior surfaces of the conical condenser, speedily cool the liquor. The upper diameter of the exterior cone is to its lower diameter as seven to four. The height of the cones is to their greatest diameter, nearly as five is to two. The least diameter of the interior cone is to that of the exterior cone as eighteen is to twenty-one, and the difference of their greatest diameters as twenty-one to thirty. So that in the largest condensers, which are about six feet high, and are used for alembics containing one hundred cubic feet, the interval between the cones at the bottom is only an inch and a half, while the space between them at the top is about five inches. The condensers of the least dimensions are formed with the same proportions.

It will readily be perceived, that a tube passes from the upper part of the condenser through the keeve, to form the connection with the still; and that another tube proceeds through the keeve likewise, from its lower extremity, to transmit the liquor.

The advantages of this condenser are, that from its particular form a complete and rapid condensation takes place in the upper part of it, and the liquor runs off below extremely cold; it is more easily made, takes less materials, and is consequently less expensive than a worm of the common sort, it is more durable, not liable to the same accidents, and more easily kept clean; since it should be so contrived that the top may be taken off, when it can be cleaned with a brush through its whole extent.
Explanation.—The figure represents a vertical section of the conical condenser, and of the vessel in which it is placed.

A A A A the exterior cone.
B B B B the interior cone, made of copper or tin.
C the ring that closes the interval above.
D the ring that closes the bottom of the interval, these rings are soldered, and serve to unite the two cones.
E E the space between the cones where the condensation of the vapours takes place.
F the open space at the lower part of the internal cone through which the water of the refrigerator passes to cool the internal part of the condenser.
G a tube through which the spirituous vapours pass from the still to the condenser.
I the feet of the condenser three in number.
K K K K the great keeve or refrigerator filled with water.
CHAPTER XIV.

On Raising Water.

ANY machine for the purpose of saving labour, which is not too complicated in its structure, nor expensive in its first cost, is of importance to the citizens of this country in general. One for raising water is particularly so to the distiller.

The screw of Archimedes, and the hydraulic ram, have long been celebrated in philosophy. The theory upon which each is founded is correct, and no doubt it may be reduced to practice; whether upon a scale sufficiently large to be useful, may be a subject of experiment.

The siphon is a well known instrument for drawing liquors. It may also be used to supply a flake stand in a distillery, provided there be a fall of one or two inches from the place the water is taken up to where it is discharged, that it be not raised more than 34 feet, and the flake stand be made air tight, and kept always full.

A patent has been obtained for something on this principle, which I believe succeeded very well.

The following descriptions, with the plates accompanying, will enable any ingenious mechanic to try the experiment.
A B, (plate 1, fig. 1,) is a box made of thin planks, which, together with its two tubular arms B C, and B D, is moveable about the centre G and H. At the extremity of each arm is a hole, as E, of such a size that the quantity of water discharged by both, shall be less than that which falls through M N. The tube A B, will therefore be constantly full. H is the axis of the whole, fastened to the interior of A B. At I is a perpetual joint, with the upper axis of which is connected the cylinder S T, with a tube coiled round it, so as to form a screw of Archimedes. The cylinder is prevented from slipping downwards by a shoulder on its axis at a, and is moveable on the centres a and b.

The action of the machine, which is easily understood, is as follows:—the water flows through R P, which is connected with the stream by means of a pipe into the box X, until it fills it as high as K. It then continues its course through the tube K L M N, and falls into the box A B. As the holes E and F, discharge less than the quantity of water which flows into A B; it will soon become full, when the water rushing out at the two holes will cause, by its reaction, the arms, and of course the box A B, to move in a retrograde manner. The axis H revolving also, turns the cylinder S T, at every revolution of which the orifice of the pipe e descends into the water x, takes in a small portion, and as the whole turns, raises it gradually to the top, where it is discharged at U, and carried off by the pipe W.
On Raising Water.

The cylinder may be prolonged to any height desired, but it is evident that the longer it is, the smaller must be the diameter of the tube, in order that the same force may move it in both cases.

Description of the valve Siphon, of the late Mr. Ami Argand, inventor of the lamps with a double current of air.

This improvement, though simple, is ingenious, and particularly adapted to large siphons, that require to be removed from one vessel to another. A valve as E, or H, (pl. 1, fig. 2,) is applied to the foot of the shorter or ascending leg of a siphon A B, B C; at the other foot of which a stop-cock F, is placed. The cock being open, and the foot E immersed in any liquid in a vessel I K, by moving the leg E perpendicularly downward and upward, the liquid will gradually ascend through the valve E, till it runs out at the point L. The pressure of the air on the surface I, will then be sufficient to force the liquid through the valve E, as long as this remains beneath it; and thus it will continue to act as a common siphon, and the vessel will be emptied, unless supplied from some reservoir as N.

As soon as the siphon is filled and begins to discharge the liquid at L, or at any period while it continues full, if the cock F be turned so as to stop it, it may be very safely and conveniently removed to any other vessel; as the cock will prevent the liquid from running out at one end, and the valve at the other;
and the moment the extremity E is immersed in the liquid in another vessel, and the stop cock K turned, it will act again as before.

The siphon may be filled in this way in a clear liquid, and then removed into a vessel of the same kind of liquid, that has a sediment at bottom, which would be disturbed by moving it up and down. This however, may not always be convenient. Mr. Argand therefore, makes an aperture with a short perpendicular tube O, in the horizontal branch B B, through which, by means of a funnel D, the siphon may be filled, while the cock F is shut, so that it may be inserted into the liquid, and made to act without disturbing it. When the siphon is thus filled, or when the funnel D is not required, the aperture at O is closed by the stopple G.

For the convenience of carrying the siphon, as well as for packing it up, or cleaning it, the horizontal and perpendicular branches are made to take asunder at the joints M M. The nozzle L is likewise made to take off, as it is frequently more convenient for the fluid to be drawn off perpendicularly.

**Description of the Hydraulic Ram.**

The Belier Hydraulique, or water ram, as this machine was called by Mongolfier, who first constructed it about 1797, is applicable to any situation in which there is a fall of a few feet of clear water, and drainage to get rid of the superfluous quantity; and as it is simple and cheap in its construction, and requires no
On Raising Water.

attendance after it is once adjusted and set to work, it is particularly applicable to the supply of houses or gardens, and pleasure grounds situated upon elevations.

The action of the water ram, as will be seen in the following description of it, is entirely dependent upon the momentum which water, in common with all other matter, acquires by moving, a circumstance which has often proved very detrimental and troublesome to plumbers and others, in fixing pipes connected with elevated cisterns.

It may have been observed by many, on turning a cock attached to a pipe so circumstanced, that the water flows with great violence; and upon shutting it off suddenly, a concussion is felt, the pipe is shaken, with a noise resembling the fall of a piece of metal within it, and the pipe is not unfrequently burst open near its end.

This arises from the new energy the water has acquired, by being put in motion and then stopped, in consequence of which it makes a considerable mechanical effort against that end of the pipe which opposes its further progress.

This effect was experienced in a great degree at an hospital in Bristol, where a plumber was employed in fixing a leaden pipe, to convey water from the middle of the building to the kitchen below, and it was found, that nearly every time the cock was made use of, the pipe was burst at its lowest end; after making many
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attempts to remedy this evil, it was at last determined to solder a small pipe immediately behind the cock, which of course was carried to the same perpendicular height as the supplying cistern, to prevent the water running to waste, and now it was found, that on shutting the cock, the pipe did not burst as before, but a jet of considerable height was forced from the upper end of this new pipe. It therefore became necessary to increase the height of the pipe, to overcome, if possible, this jet, and it was carried to the top of the building, or twice the height of the supplying cistern, where, to the great surprise of those who constructed the work, the jet still made its appearance, though not in such considerable quantities, and a cistern was placed at the top of the house to receive this superfluous water, which was found very convenient, particularly as it was raised without trouble or exertion. This is, I believe, the first water ram which ever had existence, the circumstance having taken place prior to Mongolfier’s contrivance, though he is the first person who organized the machine and made it completely self-acting, without ever turning a cock. His construction is represented in the plate, where A is a cistern, (or part of a running brook, which may be dammed up to make a head of water,) and B, C, a quantity of iron or wooden pipes, extending from 18 to 30 or 40 feet in length, according to their diameter, to conduct the water away; these pipes are laid in a sloping direction, so as to reach the greatest depth D, at which the water can run off, which may be from one to six or eight feet below the head A. The water would naturally run to waste from the end E of these
pipes, but that is closed by a blank or solid flanch, and it is only permitted to escape through a solid hole in the centre of the horizontal flanch F, from whence it will run in an uninterrupted stream. This hole is, however, equipped with a valve within it, as at F, and this valve is so adjusted as to sink by its own weight in the water, while that water is motionless or moving slowly.

Now if we suppose the pipe B, C, D, to be supplied with water from A, that water will at first pass round the valve, and discharges itself at F; but as soon as it has acquired a small additional force by moving, it will be more than equivalent to the weight of the valve F, and will lift it, by which the passage of the water becomes instantly stopped, and an effort will be made to burst the pipe D; this is prevented by the second orifice over the letter D, communicating with the chamber G and air vessel H, from whence there is an immediate communication by the pipe III, with the elevated situations to which the water is to be thrown. As the effect of the blow which the water makes is instantaneous, it becomes necessary to place a second valve between the air vessel and the chamber G, but below the pipe I I, so that any water which is thrown into H by the effort, may be confined there, and acted upon by the condensed air, instead of permitting it to return and equalize itself in the pipes C, D. The blow which the water makes is so sudden and violent as to produce an expansion in the pipe D, which is as suddenly succeeded by a recontraction and trifling vacuum in D, by the tendency of the water to
return up to C when stopped; the effect of this is to bring down the valve F, by which a free passage is once more opened for the water, which again flows and shuts F as before, to produce another blow or pulsation, by which a second quantity of water is thrown up I I. Each repetition of this operation affords a fresh supply of water.

It will be evident that the valve F, as well as V, will require some adjustment as to weight. This is effected by making these valves of hollow brass balls, having a hole on one side, by which some shot or small piece of metal can be introduced to adjust the weight. The hole is afterwards stopped by a screw, which projects and forms a shank or tail to guide the valve. The screw over V is likewise to adjust the height to which that valve should rise, and to prevent its breaking away and getting into the air vessel, which it otherwise might do from the violence of the blow.

It has been found, that after using the water ram for a short time, as it was formerly constructed, the air in H became absorbed and entirely disappeared, and by its ceasing to act as an air vessel, the water would not proceed to any great height up I I. This is obviated in the present case by the chamber G placed between the air vessel and the pipe D. From the form of this chamber, any air which enters it becomes confined in the recesses K K, and not only equalises the action on the valve V, but makes the whole motion less instantaneous. K K becomes supplied with air in small machines, by the falling of the
valve F, which brings a small quantity of air down with it. In larger ones, it will be necessary to apply a small shifting valve, or spring valve opening inwards to some part of the outside of G, when the air, as it enters, will rise to the top of K K, and as it accumulates, will at length pass through A into H, and keep it supplied with air.

This latter contrivance, I believe, originated with Mr. Dobson, of Mortimer-street, Cavendish-Square, who has paid considerable attention to the improvement of this engine, and proposes erecting them for the public. In the rams which I have seen, the tubes B, C, D, have been from 1½ inch to 4 inches diameter, and the ascending pipe I I, one inch, or rather less. I have seen the valve F make from 50 to 70 pulsations in a minute, and I should think discharging near half a pint of water at each pulsation, at the height of 30 feet, with a six feet head. I am, however, told, that a machine has been made which furnishes an hundred hogsheads of water in 24 hours, to the height of 134 feet perpendicular, with a fall of four feet and an half. I am not aware that the best proportion of parts has yet been ascertained, or the quantity of loss compared with the quantity delivered up I I, which must in a great measure depend upon the heights of the respective heads, and the size and length of B, C, compared with the perpendicular fall from A to D. I intend entering into an examination of these points, and if you should think the result of my inquiries worth inserting in a future number of your journal, they shall be very much at your service.
CHAPTER XV.

Of the Thermometer.

THE thermometer was invented by Sanctorius, an Italian physician, about the beginning of the 17th century; but it was of little use until improved by Mr. Boyle and Sir Isaac Newton.

Thermometers are made by putting mercury into small glass tubes with bulbs, and heating these bulbs until the mercury boils. This ebullition exhausts the tubes of air, and they are hermetically sealed while the mercury is boiling; which preserves the vacuum. The bulb is then immersed in ice or snow, and the point to which the mercury falls is called the freezing point. The intermediate distance is afterwards correctly graduated.

Thermometers filled with alcohol are useful for ascertaining very low temperatures, in which mercury would be frozen; it is only by the most intense cold that can be produced that alcohol can be frozen. For very delicate experiments air thermometers are used, in which as the air is expanded or contracted, a coloured liquor is made to rise or fall, which marks the degrees of expansion, and consequently the variation of temperature, they are called thermoscopes.

Fahrenheit's thermometer is universally used in this