Tumefaction of Starches.

Some time since, Mr. W. H. Symons exhibited at the Royal Microscopical Society a hot and cold stage for the microscope, by means of which the exact temperature at which different starch cells swell or tumefy could be observed. By means of this instrument this observer determined the tumefaction point of a number of different starches, and as some of them are largely used by brewers, we give his results:

Starch.	*A few swollen.*	*Majority swollen.*	*All swollen.*
Potato	55° C.	60° C.	65° C.
Sago	64° C.	68° C.	74° C.
Bermuda arrowroot	62° C.	69° C.	73° C.
Wheat	60° C.	65° C.	70° C.
Maize	65° C.	70° C.	77° C.
Oat	65° C.	70° C.	77° C.
Rice	70° C.	75° C.	80° C.

It will be observed that, as a rule, the largest starch cells tumefy at the lowest temperature; and in accordance with this, rice requires the highest temperature of all the starches experimented on for the complete tumefaction of its cells. It was further proved by Mr. Symons that prolonged exposure to a temperature a little below that of tumefaction not only does not tumefy the granules, but enables them to bear a slightly higher temperature than they otherwise would do. When starch granules are gradually heated, the majority do not burst their integument by splitting it from the nucleus in all directions, as when they are subjected to a sudden rise of temperature, but a small bladder-like process is thrown out near the nucleus; and if the temperature be kept constant the swelling increases, although still confined to that portion of the granule, bursts, the granulose oozing out, and if sufficient time be allowed, the integument, still retaining the original size and shape of the truncated granule, is all that is left.

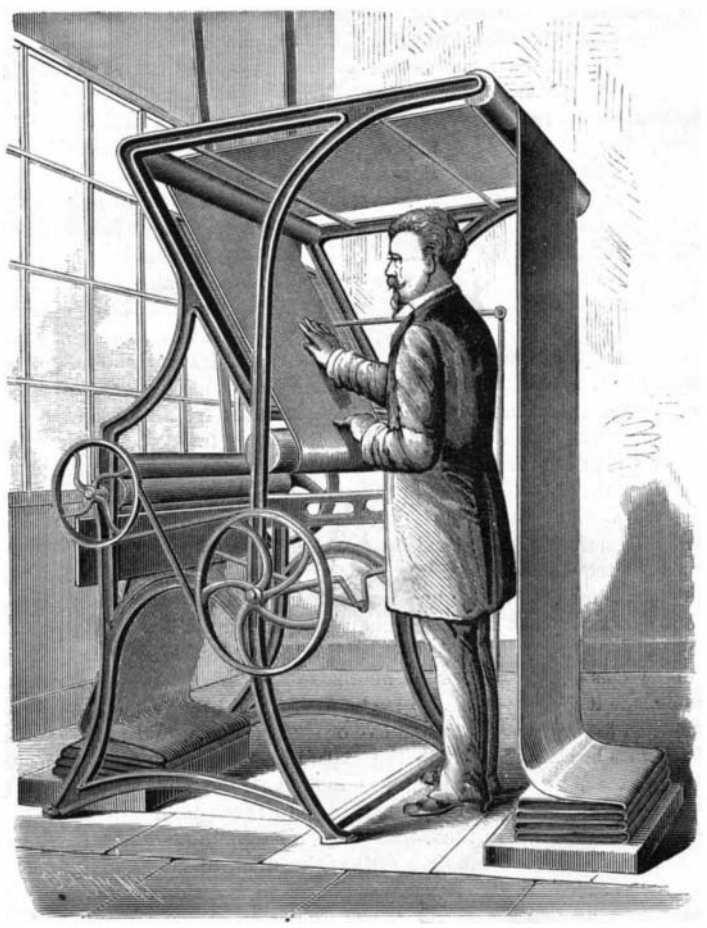
MACHINE FOR EXAMINING GOODS.

One of the most important duties in a mill or warehouse is that of examining the goods made or bought. With the best of machines and the most careful workmen faults and defects may occur, but, considering that all machines are not always perfect, and that all work people are at best only human, we must be prepared to find in every class of goods faulty parts. To detect this, to put the faulty pieces aside in order to draw the attention of the delinquent to them, and, if necessary, to fine him or her, and also to mark the goods as damaged and indicate a certain allowance on them —these are functions which ought to be intrusted to vigilant persons, and the task of examining the goods ought to be made as easy as possible.

In most cases the cloth is laid upon a table before a window, and layer after layer turned over by hand, which is not only a tiring but also a tedious proceeding, and, on that account, liable to be done sometimes inefficiently. We have, therefore, in many places seen a roller affixed to the ceiling of the room, and the cloth drawn over it by hand; this, when done before or behind a window, as the goods may require, shows all faults of weaving, but not always those of dyeing. A foreign machine maker has carried this arrangement a little further, and constructed a machine for the purpose, which is driven by a strap, so that the examiner has only to attend to his duty, and, his hands being free, can mark the cloth or brush it up, or otherwise attend to it more closely.

The construction of the machine will be easily understood; it is shown as placed before a window; the cloth is laid before it on a board, then passes upward through a couple of drag rollers, over a guide roller, and then in front and over a strong sheet of plate glass, and then over a pair of upper rollers down to the floor behind the examiner. The latter thus sees through the cloth as it passes the glass plate, and is able to detect all faults and blemishes of weaving; by means of a treadle he can put a brake on and stop the course of the cloth any moment, for the purpose of marking a faulty place or other reason, and his work being thus performed without bodily exertion, can be more thoroughly relied upon.

In our illustration the machine is shown driven by a strap, which is the most convenient arrangement in a mill; but as much of the work of examining goods is performed in warehouses, the machine is also made to be turned by a treadle, which the examiner has, in that case, to work by his foot, and thus can also stop the machine when required.—*The Textile Manufacturer.*



MACHINE FOR EXAMINING GOODS.

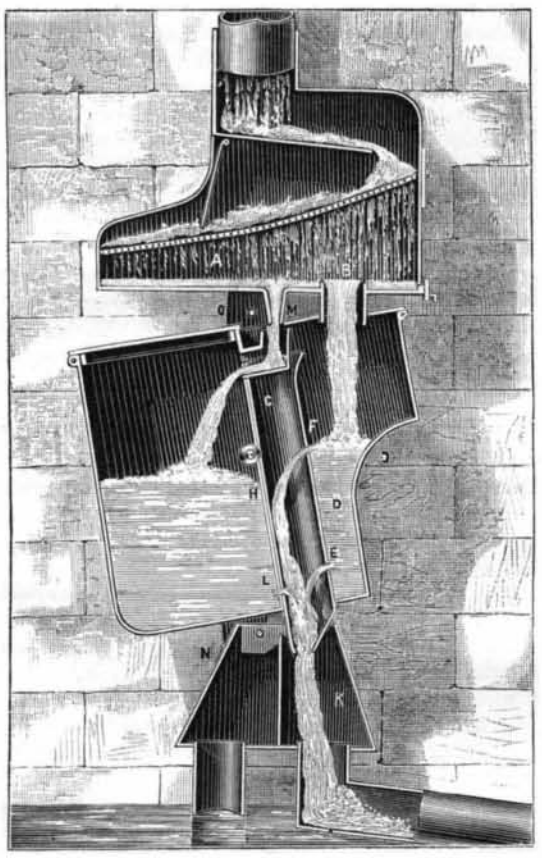
Heating by Acetate of Soda.

The heating of small pits and greenhouses is, in spite of the numberless apparatus in use, a source of trouble. To such folk—and their number is legion—the new plan of heating by acetate of soda seems as if it might be developed into something serviceable. According to an article in *Nature*, the plan is largely adopted on the London and North Western Railway for foot warmers.

The duration of heat in a warming pan with acetate of soda is claimed to be four times that of hot water alone. This is due to the amount of heat required in the first instance to change the acetate of soda from a solid to a liquid state, which heat is liberated as the acetate gradually resumes the solid form. It is stated that only about half the heat is required to produce the same effect as in the case of hot water. The acetate does not require to be renewed except at long intervals. To restore the heat in the pans after cooling, they have simply to be plunged in boiling water for half an hour.

ROBERT'S AUTOMATIC RAIN WATER SEPARATOR.

In a goodly number of countries where water is scarce the precaution is taken to collect rain water in cisterns, whence it is drawn in measure as it may be needed. In



ROBERT'S AUTOMATIC RAIN WATER SEPARATOR.

certain slightly favored countries such water constitutes nearly the sole resource of the inhabitants. It will be understood, then, how important it is to collect it, and especially to preserve it. The first and greatest precaution to be taken is to admit into the storage reservoir only the second water, for the time which elapses between successive showers allows the roofs and other surfaces that collect the water to become dirty and thus foul the first water that falls. And such water, if care be not taken to lead it into the drain, will dirty and pollute the entire quantity stirred up.

The Robert separator is designed to overcome the above named annoyance automatically and regularly. It prevents the first rain water that has washed the roofs and gutters, from entering the cistern, and leads it into a special reservoir or carries it to the drain.

The annexed figure will permit the very simple arrangement of the apparatus and its mode of operation to be readily understood. It is situated at the base of the leader, and its dimensions vary with the superficies of the roof to be drained. It includes a stationary and a movable part. The former of these, which is connected with the bottom of the leader, carries a movable perforated disk for arresting the solid particles, and an outlet, B, at the lower part. The separator, which is movable around a horizontal axis, is seen at C, and is divided into small compartments, D, into which falls the first rain water. E is an orifice proportioned to the surface of the roof, F is a wider orifice to permit the flow of water during ordinary rains, and G is a discharge pipe. During heavy rains the water fills the compartment, D, and bows over the upper orifice of the discharge pipe. H is a small orifice in the partition behind the pipe, G. When the entire amount of water that has fallen is unable to flow through E, it rises in the compartment, D, and, passing through the orifice, H, slowly fills the compartment, I. The apparatus is then inclined as shown in the figure, and the clean water changes its direction, passes through K, and enters the cistern. L is a small aperture near the bottom of the compartment, I, which permits the latter to empty, and M is a pipe through which flow the last drops of water when the rain ceases. N is a hook which prevents the separator from swinging and permits the whole of the water being sent to the drain when, for any reason whatever (a repair of the cistern, for example), it is desired to admit no more rain water.

When the apparatus is empty and the water begins to fall the latter is sent to the drain; but, as soon as the water increases, and the time has elapsed necessary to wash the roof, it flows through H, fills the compartment, I, and tilts the apparatus, and then begins to flow through K to the cistern. When the rain ceases, the compartments empty and the apparatus tilts anew to prepare itself to send to the drain the first water of the next shower, and so on. Everything is arranged, then, so that the cistern shall receive only clean water which has been freed from every kind of impurity that fouls the roof.—*La Nature.*

Test for Ammonia.

A sensitive test for gaseous ammonia is proposed by Gustave Kroupa. He dissolves magenta in water, and gradually adds dilute sulphuric acid, until the yellowish color passes into a yellowish-brown. Unsized paper is saturated with this solution, and then assumes a yellowish color, becoming crimson on exposure to the vapor of ammonia. This test is declared to be exceedingly sensitive, and as simple and easy to prepare as turmeric paper. The magenta test papers must be preserved from contact with the air, in closely-stoppered bottles; and it is not stated whether the test must be made wet or dry, or what minimum proportion of ammonia will be detected thereby, in order that it might be seen whether the new test possesses any advantages in this respect on the universally used turmeric test.

Examining Trainmen for Promotion.

A Jersey City paper gives the following account of the way promotions are made on the New York Division of the Pennsylvania Railroad: For the past three weeks twenty-nine brakemen and baggage masters on the Pennsylvania Railroad have been attending school in the reading room of the Jersey City depot. In anticipation of a big passenger business the coming spring and summer, the company has thought fit to supply itself with more conductors. Capt. Osborn, the ticket receiver at Jersey City, who has the railroad ticket business at his finger's end, is instructing the class of twenty-nine men. He shows the men the privileges accorded the different classes of tickets, and how to act when a passenger tenders a ticket which is worthless for passage.

Captain Osborn will soon begin to examine the twenty-nine men. This will take two weeks at least. A number of the men have been brakemen for ten or twelve years.

After each one in the class has undergone a rigid examination, Captain Osborn will recommend about ten of those who pass the best examination. The names he selects will be referred to Mr. Pettit, the superintendent. These men will then be sent to the general office of the company, on Fourth Street, where they will be subjected to another examination of a week's duration, which will be conducted by an examining board appointed by Max Riebenack, the general auditor of passenger receipts. This is the final examination, which decides the fate of the aspirant in the ticket technicalities of the position. After this the candidates for conductorships who have passed at the Fourth Street office go back to Jersey City, where Mr. Adams, the trainmaster, takes them in hand, and finds out what they know about transportation, how they would act to prevent accident, and what they would do in case of a smash up. If they pass in this branch, then they receive their commissions as conductors. As there are hundreds of different kinds of tickets, whose privileges and value are of several conditions, and the knowledge required of the aspirant as to transportation is very intricate, a man has to have a good head to get through. He must be possessed of natural intelligence, and must have acquired a vast amount of experience before he can hope to be made a conductor.

AN International Exhibition will be opened at Calcutta next December. Two thousand square feet of space have been reserved for American exhibitors.