Correspondence.

Mr. Allen. Mr. PERCY ALLEN remarked that while the Paper gave a description of modern cooperage machinery, there were other systems of producing casks and barrels which were worthy of consideration. Barrels of paper and of wood-pulp fibre were now made in America and this country, either by pressing the pulp into exhausted moulds, or by lapping the pulp on metallic cylinders which were afterward collapsed and withdrawn from the pulp-shell. In both processes a seamless cylinder was produced, and in some of the American factories a bulging-form was imparted to the cylinder by placing it in a "bulge-mould" and expanding an india-rubber bag inside it. Square packages could be made by a modification of that method, and were extensively used for the shipment of matches. Barrels or casks made thus required to be indurated or water-proofed, and that was commonly done by treating them with linseed or resin oil, and stoving them at a temperature of about 400° F. Another form of barrel made of paper had lately been produced in Germany, in which the body of the barrel was made up of separate sheets of paper consolidated and rolled under pressure; the bulge being obtained by gores cut out at the ends, with the alternate sheets arranged to break joint. Those casks were now being tried for holding beer; for which use the heads were fixed with metallic lining-hoops and the casks had metallic bung-holes. Paper and pulp-casks, properly made, resisted the action of most chemicals and possessed considerable strength, but their external appearance rendered them unacceptable to dealers in edibles.

Various wooden casks had at one time or other been offered to the public, but as far as he was aware they were only a few that had been much used, viz., the Andrews barrel, the grooved and tongued barrel made in Belgium, the Guelph barrel, and barrels made on the staveless or one-piece system. In the first-mentioned barrel, the staves were grooved-and-tongued, and were nailed together on iron hoops at the place of manufacture, being afterwards transported in the flat form and bent into a circle by a simple form of press worked by hand, the heads being secured by means of lining-hoops. In the grooved-and-tongued casks made in Belgium for holding cement, the grooves and tongues were of V-form. That seemed to produce a satisfactory result, as the casks were used with-

out being papered inside. The Guelph casks were made of sheets cut in America and transported flat, and were rolled up on a making-up machine, two or more layers of sheets being arranged to break joint. In all forms of drum-casks, where it was desired to get the power of rolling and turning them on their centres, a broad hoop was placed round the middle of the drum to give the effect of a bulge. Staveless barrels, or barrels made of one stave of a breadth equal to the circumference of the barrel, seemed to have been first thought of in America about twenty-five years ago. At first the effect of the gores made to produce the bulge was obtained by simply running saw-kerfs down the ends, thus allowing them to be drawn together by the hoops; but now the gores were usually cut out to approximately correct shape either by circular saws or by punches and dies. Most inventors had proposed to make the sheets for those barrels of a continuous piece of wood turned off the log in the form of a shaving—the log being rotated against a broad knife fed continuously towards the centre; and some inventors had proposed to cut the V-grooves and to chime and croze the sheet while it was being unrolled. Mr. Allen.

Having been recently concerned with the re-arrangement of a factory near Antwerp, where the manufacture of staveless barrels and box-board sheets was carried on, he would give a brief description of the process.

The operations were as follows:—The trees were cross-cut in lengths which represented the height of a barrel, or the height of two barrels of smaller size; they were then boiled or steamed. The period of boiling depended on the nature and condition of the wood, and ranged from three hours, for poplar or aspen, to seven or eight hours for beech. The logs were barked previously to being placed in the cutting-machine, so that they were kept hot and the surface was protected from grit. The cutting-machines employed at Antwerp were made on the Onkin principle, and were of peculiar design. Besides the ordinary rotation of the log between the centres and the forward feed of the knife, both the head-stocks carrying the centres and the carriage holding the knife had a parallel oscillating motion. The effect of this was that a double shearing motion was imparted to the knife and pressure-bar, and a very clean cut resulted. The sheet of wood, as it came from the machine, was cut approximately into breadths for the barrel by broad shears, and the sheets were then conveyed to a crozing-machine, which had three cutter-heads running on one spindle. This trimmed the ends of the sheets, cut the crozes, and chimed one or both ends of the sheet. If the three heads were

Mr. Allen. used at the same time, one long sheet might be divided into two smaller barrel-sheets. From this machine the sheets were passed to a V punching-machine, in which the gores were stamped out at each end of the sheet so as to permit it to assume a bulged shape when made up. Those V's were so arranged as to come alternately at each end of the sheet, thus preventing splitting across from one to the other. The punches were made slightly concave, so that they first entered the sheet at the point and the two opposite ends, the shearing action thus proceeding towards the centre. That form of punch effectually prevented any splitting of the sheet, but it was rather difficult to harden and keep in good cutting order, and it would seem better if the punch were made up of separate blades. A varying degree of bulge could be given to the finished barrel by varying the feed-motion of the punching-machine. Other methods of cutting these V's, as for instance with "drunken" saws, had at various times been tried, but the plan by punching was rapid and seemed to answer the purpose. When the sheets came from the V punching-machine they could, if desired, be made up into barrels directly, or they could be dried and stored for future use. At Antwerp the sheets were loaded upon small wooden trucks, with battens between them to allow circulation of the air. The loaded trucks were then passed in order through the dry-houses, which consisted of two parallel sheds, each 70 feet long by 8 feet 6 inches square. A large volume of air was swept through the two houses by an exhausting-fan placed at the end at which the loaded trucks entered, and the incoming air was heated by a system of steam-pipes conveying exhaust steam. The best construction of dry-houses was a matter upon which many conflicting opinions were held; but his experience was, that at all events, for drying barrel-sheets the best results were obtained with a large volume of air passed through once at a comparatively low temperature. The average contraction of poplar, aspen, and alder sheets dried in that way, ranged from 6 per cent. to 8 per cent. across the grain. To convert the dried sheets into barrels, they simply needed to be softened by being steamed, and they then could be bent by hand and headed and hooped in the usual manner. Where large quantities had to be made up, the Oncken Company supplied a small plant, consisting of a continuous steaming-tank and a machine for putting the truss-hoops on, which bent the flat sheets into barrel form, and, by means of two movable bell-machines, forced the truss-hoops on and ejected the barrel. This machine would turn out casks of cement-barrel size at the rate of one a-minute. As they fell from

the machine they were placed on an endless band, which extended from a small exhausting-fan to a coke furnace. The barrels were put on the cool end near the fan, and were taken off near the furnace, and formed a kind of conduit for the hot gases thus drying and setting them. Mr. Allen.

Barrels and casks made by that method were of clean and attractive appearance, and of uniform size, and the flat sheets could be conveniently stored or shipped; but for a factory to produce them economically, it was necessary to develop at the same time a trade in box-boards, lap-boards for cloth and the like, so as to use up all the small pieces of sheeting and defective barrel-sheets. About 10 cubic metres of wood could be converted daily at the works at Antwerp, and the actual cost of manufacture, inclusive of rent, taxes, depreciation, wages and all establishment charges, was nearly double the cost of the wood at the factory. It might be mentioned in connection with the continuous system of cutting timber, that the timber grown in northern latitudes cut cleaner on the side of the trunks facing the north than on the other side. This was very noticeable as the long sheet was being unrolled from the log. He considered that the staveless system was best adapted for barrels not exceeding 30 inches high and 19 or 20 cubic inches in diameter with the bulge and frame $\frac{1}{2}$ inch to $\frac{5}{8}$ inch thick.