

orders for finished linens are being placed on a liberal scale at recent full rates. Brown cloth is going steadily into consumption, and more might be done if manufacturers were inclined to book. Prices are very firm. Yarns are meeting with well sustained inquiry, and sales continue large. Prices nominally unchanged, but any further increase in buying would make them advance.

**ZURICH**—Buyers are in the market, but their presence has not made business lively. Prices they offer are too low and are acceptable only when manufacturers are anxious to sell their goods at any cost. Business with the United States is improving, but not to the extent that might have been expected from the result of the election. With London the business doing leaves room for improvement. The experience of the recent past has not encouraged manufacturers in producing extensive lines of novelties. These are scarce and hard to find in desirable styles, so that buyers have more or less to limit their operations to the more staple goods. In *surahs*, *merveilleux* and *taffetas* some fair-sized lots have changed hands, but at unsatisfactory figures. Changeable *taffetas* have been ordered for future delivery.

**CREVELD**—The feeling in the silk goods market has improved. This improvement is not great, but after so many months of slowness and expectation even this is welcome. Buyers, wholesale as well as retail, are showing more disposition to operate for the future. These orders are not for heavy quantities, but they show at least what are the views of buyers in regard to future styles. The delay in placing orders may be partly attributed to the uncertainty about the coming styles. This uncertainty seems to have disappeared, and after all no important change in the fashion is likely to occur. Buyers have so far favored *taffetas*. Changeable *taffetas*, fancy effects on *taffetas*, *armures* and *taffeta* have been ordered. *Damasses* have also been the object of buyers' attention. With the other fancies are also included fancy effects on velvet, which have been fairly well ordered for future delivery. Business for export has improved and conditions generally are becoming more favorable. The industry is now inclining towards an increase in production, which has already commenced, more activity being noticeable in the production of dress and trimming silks. In other branches activity is fair. The good season which umbrella silks have had is likely to continue, orders having been placed for novelties for next summer. In tie silks new orders are not plentiful, but manufacturers have sufficient work on hand. In ribbons the situation is not very bright, and in silk ribbons there is room for improvement as far as production is concerned. Velvets are in fair demand.

**CHEMNITZ**—Trade in hosiery is fair. Orders are coming in freely, and buyers in town are trying to secure goods at prices paid two months ago. This they find difficult, especially as the leading numbers in fine-gauge hosiery have gone up as much as 10 per cent. If trade picks up to the extent expected goods will cost still more money in a few weeks, and even if this hope should not be realized there is no prospect that prices will be lower before the season is over. Orders call almost entirely for *Hermesdorf* black, only about one-quarter being taken in tan shades. In the tan assortments shades vary from the very lightest to almost a garnet, but medium dark shades are the most used. In fancy hosiery Persian stripes are preferred to the old plain-colored stripes. Embroidered hosiery are also selling freely, especially in the better grades. In gloves business is still dull, and the manufacturers use this lull to finish their lines for the coming season, which will soon open up.

### WATER HAMMER.

#### SOME EXPERIMENTS TO SHOW WHEN IT MAY OCCUR

A report of some experiments upon the causes of steam-pipe explosions, made to the British Association for the Advancement of Science, shows under what conditions water hammer may be expected in steam pipes and under what conditions it becomes dangerous. The tests were made upon steam pipes six inches in diameter and .197-inch thick. The ends were closed by flanges and provided with drain cocks and air-relief cocks, and suitable pressure gauges that would record to 2,133 pounds, one on the end flange

and one on the top of the pipe. The pipe was inclined upward, and entering the bottom flange was a steam pipe with a valve so that if any water was in the pipe the entering steam must pass through it.

The second experiment was conducted upon 12 inch pipe, one-quarter inch thick, with four pressure gauges, steam being supplied at the bottom through a three inch pipe. The position of this pipe was afterward considerably changed. The tests made were as follows: 1 Pipe without water, air cock closed and the drain cock open. 2 Pipe without water, air cock open and the drain cock closed. 3 Pipe without water, air and drain cocks open. 4 Pipe without water, air and drain cocks closed. 5 Vacuum in pipe and some condensed water formed by creating vacuum, air and drain cocks closed. 6 Vacuum in pipe, and the latter filled with water to about one-third of its cubic capacity, so that the point where the steam entered was under water in the first pipe, it being made to incline toward that point. In the second pipe the water filled the bottom of the pipe. Air and drain cocks were closed to one third of their capacity at one end, and running to nothing at the other end. 7 Pipe without vacuum filled with water as under 6, air and drain cocks closed. 8 Pipe without vacuum filled with water the same as under 6, air and drain cocks open.

In the experiments with the first steam was admitted from a boiler under 70 pounds pressure, by rapidly opening the stop valve on the main steam pipe, the influx of steam having been regulated beforehand by adjusting the valve close to the experimental pipe. Beginning with one-fifth of the area of this valve, the opening was increased one-fifth in each of the succeeding tests, the whole tests being frequently repeated to check results. In carrying out tests 1 to 4 no motion was observed, whether the filling of the pipe with steam was retarded or accelerated. The pipe became heated slowly or quickly, according to the rapidity with which it filled with steam, until it became thoroughly warmed, and the pressure gauges on the pipe showed same as boiler. As soon as vacuum formed and a small amount of condensed water was present in the pipe (test No. 5), light hammering was present in the pipe when steam was admitted. This was not, however, indicated on the gauges, but caused a slight movement in the pipes. This hammering and backward and forward movement of pipe became more intense the greater the quantity of water present (tests 6 and 7), manifesting itself in distinct blows at short intervals, and causing the gauges to show between 126 to 242 pounds. Whether the vacuum in the pipe (test 6) had any influence on the action of the steam when admitted, could not be determined by any of the trials.

The heaviest hammering, as well as the greatest movement of the pipe—which also continued for some length of time—were observed when the pipe was about one-third full of water, and both air and drain cocks kept open (test No. 8), and for all five openings of the valve. During these tests there was a uniform discharge of water from the drain cock and of air from the air cock, for a longer or shorter time, depending on the opening of the stop valve in the pipe. For instance, with one-fifth opening of the stop valve the first hammering was noticeable after four minutes, at three fifths opening, after 30 seconds, and 15 seconds after the valve was wide open, powerful hammering and violent motion of the pipe set in, in each case accompanied by an impulsive discharge of water and air, the latter by steam from the air and drain cocks. These phenomena are due to the fact that the steam is condensed by the water present, and only when the water has attained the temperature of steam does the impulsive action of the latter set in. The pressures observed on the gauges at the end of each trial (test No. 8) fluctuated between 284 and 1,666 pounds. At one time the greatest pressure would be observed on the gauge tapped in the flange at end of pipe, and then on the gauge on side of pipe.

The second experimental pipe was changed somewhat from time to time, but showed no radical change in results.

As a result of these tests it is shown that destruction of a completely drained, though entirely cool, pipe cannot occur, whether the stop valve near the boiler under steam is opened gradually or in a sudden, careless manner, because hammering, which alone can cause an explosion, does not follow. But it is to be observed that