CAUSES OF FIRES IN BREWERIES.

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In recent years insurance companies have been so often called upon to make good the loss by fire in breweries, that an investigation of the causes of such fires seems not only necessary but imperative, to obtain Profitable business for the companies writing such risks.

A general knowledge of the manufacture of beer is necessary in order to clearly understand the various hazards arising during such manufacturing. Our object is to give a general description of the process of brewing, and to point out, as we go along, the various hazards encountered, and, if possible, suggest such improvements as will reduce these hazards.

Brewing can be divided into four general divisions, viz. : Malting, mashing, fermenting, and fining and storing the beer for future use. We will take up these divisions in the above order.

MALTING.

By malting we understand the artificial germination of grain, generally barley, the arresting of this germination at the proper stage, and the subsequent drying of the germinated grain on kilns. The grain to be malted is placed into large tanks of water (steeping tubs) generally in the top story of the malt house. The dust, shriveled and light grain floating on the top is removed; the balance remains in the water until well softened. This period varies according to the age of the grain and the temperature of the water - from forty-eight to seventy-two hours for fiesh grain, and from six to seven days for old hard grain (Wagner's Technology). When thoroughly softened the grain is removed from the steeping tubs and spread on the growing floors, where the germination begun in the tubs is continued until the radicles or rootlets of the grain obta n about two thirds the length of the berry. Care must be taken to prevent too much growing, for in such a case the radicle begins to draw nourishment from the body of the berry and spoils the malt. The germination of the grain changes part of the starch it contains into sugar. While on the growing floors the grain is partly dried by the heat generated dur ng germination. To supply the oxygen necessary to germination, air must be given free access to all parts of the grain. This is done by frequently turning it with wooden shovels. From the growing floors the grain is removed to the malt floors, and from there to the kiln floors to be thoroughly dried by artificial heat. Kiln houses have frequently been the source of fires, and a description of the same becomes necessary.

When properly constructed the kiln house should be fire-proof. The kilns or furnaces are always on the lowest floor, and should have a brick floor and a brick arched ceiling. The flues must be very carefully constructed. They are generally built passing from one side of the building to the other, so that the heat may be more evenly distri buted. The fuel is usually coke, since this fuel gives off the least amount of sulphurous vapors. The floors on which the grain to be dried is spread are usually of wire netting or of perforated iron plates resting on iron girders. To prevent the burning of the malt while on the kiln floors, it has to be constantly turned. In more recently constructed malt houses this is done by mechanical means. Openings between the kiln house and the malt-house proper are necessary. Such openings should be protected by good iron or iron lined doors properly hung, and with good stone sills and lintels. The wall between the two buildings must be a good fire wall, extending through and at least three feet above the roof, and properly coped. The malt is generally conveyed to the kiln floors through spouts. These spouts should be of iron, and provided with iron slides where passing through the wall, so that a possible fire in the kiln house can be prevented from reaching the main building through these openings. Fires in the kiln-house generally originate through carelessness in watching the furnaces, causing excessive heat and ignition of the malt on the lower floors, or through carelessness in cleaning out the rootlets, which, falling off the drying grain, may have dropped through the opening in the iron kiln foors and accumulated above the furnaces. The kiln house should be most thoroughly cleaned out at least once a week, and all dust and neglected grain carefully removed.

In the malt-house proper the principal source of danger is the dust created by the frequent handling of the grain, in elevators, spouts and conveyors, all of these contrivances acting as flues to carry a fire from floor to floor. The cleaning of the grain, which is often done in the attic or barley loft, unless great care is taken in properly oiling the bearnings of the cleaning machinery, is frequently the cause of a fire from friction in these rapidly-revolving machines. The inflammable nature of grain dust is now well understood. The greatest care must be taken to prevent the accumulation of dust in such places where oil from the bearings can drop thereon, so as to avoid the danger from spontaneous combustion of oily grain dust.

Metal drip pans should be placed underneath each bearing. Dust from cleaning machinery should be blown outside, or, where dust chambers are necessary, such chambers should be cleaned out regularly, and always without artificial light.

Covered lights, or better still no lights at all, should be used where grain dust is made. Friction in the elevator boxes has occasioned fire in several instances. Such fires are always had to handle, because the elevator box, acting as a flue, carries the fire to the upper stories in an instant.

A flanged pulley at the head of the elevator is an improvement recently adopted. Such a pulley prevents the belt from slipping from side to side, and prevents the cups from striking the sides of the box. Malt for porter or stout has to be roasted after leaving the kilns. This roasting is done in machines similar to coffee roasters. Where such a machine is used, great care must be taken to thoroughly cool the roasted malt before putting it into bins. Tolerable cool roasted malt has been known to ignite spontaneously.

Fires in malt houses are generally followed by heavy claims for damages. A very little smoke renders the malt unfit for use, and when wet, unles, quickly dried, fermentation soon sets in, which ruins the malt. Malt houses are generally strongly built; the stories are how and well supported. The growing floors and the malt floors are laid either with cement or asphaltum pavement. The windows are small. The storage of grain in the top floor is not very desirable, since great weight put on this part of any building causes a general collapse in case of a serious fire.

Malt houses generally have a boiler and engine for hoisting and other purposes. Such a boiler is best located in a separate building. In writing stock policies in malt houses only, it is well to insert "excepting malt on kilns."

MASHING.

After the malt is made the next step is the preparation of the mash or beerwort, or wort, as it is generally called. This process can be subdivided into: 1. The bruising of the malt or milling. 2. The mashing. 3. The boiling and flavoring of the mash. In order to better extract the sugar contained in the malt, it has to be ground into a fine meal before putting it into the mash tub. This grinding is generally done by two iron, chilled iron or steel rollers, smooth or corrugated, revolving against each other with equal or differential speed. This mac in , known as the malt mill, has been one of the most frequent causes of fires in breweries. The object of this paper is to give a general idea of the fire hazards connected with the manufacture of beer. Of these, in our estimation, the malt mill is one of the most serious and demands a more full explanation. As above stated, the malt mill consists of two iron or steel rollers set in a frame in such a position that the malt coming from above through a spout is passed between these rollers and crushed into a meal. There is no general rule for the location of the malt mill; each brewer places his mill in the most handy position, without regard to the relative hazard of the various positions. They (the mills) are, however, generally found in the lower stories of the brewery building. The malt entering a brewery makes the following circuit: Being received on the first floor, it is emptied into the weighing hopper, from which it is carried to the upper stories by means of elevators and distributed in the storage bins by conveyors. From these bins it is run through spouts, usually of wood, to the mill to be ground. Then another elevator is called into operation to carry the meal to the storage bin for ground malt, from whence it is run into the mash tub In the above arrangement the frequent passing of the grain, and subse-