and A will give the down bevel, and A will be the flatfoot cut. B C is the short cut of the common rafter, B E the rise and C E the length; a bevel set at E on the line C E will give the down bevel, and at C the bottom bevel. B D is the short run of the common rafter and the same as BC; then AD is the run of the hip, DF the rise, and A F the length of the hip rafter. The bevel at F is the downbevel, and at A the bottom bevel. A H shows the hip rafter dropped down to position. To find the length and bevel of the jacks for the side of roof having the short run of common rafter, space the jacks on the line A B and draw perpendicular lines joining the hip line A H for the length of jacks. A bevel set on the angle at G will give the bevel across the back. The down bevel is the same as that of the common rafter for the short run, and is shown at E on the line C E. H is the apex of the triangle formed on the side of the roof having the short run of common rafter. It is evident that the apex of the triangle formed on the side of the roof having the long run of common rafter must be at the same point, therefore H is the apex of the hip and of the common rafters from either side of the hip. Now, to find the lengths and bevels of the jacks on the side of the roof having the long run of the common rafter, measure down from H to I the length of the common rafter on the long run, which is the same as A E. From I set off the short run of common rafter to J, connect J with H, which places the hip rafter in position for finding the lengths and bevels of jacks on the side of the roof having the long run of common rafter. Space the jacks on the line I J and draw perpendicular lines joining the hip line J H, which gives the lengths of jacks. A bevel set in the angle at K will give the bevel across the back. The down bevel is the same as that of the common rafter for the long run, and is shown at E on the line A E. The circular lines show that taking H as a centre the triangle H I J will swing around opposite the triangle A B H, and bring every jack opposite its mate on the hip line A H, thus proving the correctness of the method, as well as showing how to space the jacks correspondingly. It will be noticed that this system can be adapted to unequal roofs as well as to those that are uniform, or of equal pitch, a very important feature.

> Weighting Windows.

In hanging sashes the weights should be so adjusted that the lower sash will just balance the weights nicely, then

use the same number of pounds for weighting the upper sash, and, as the upper sash is always lighter than the lower one, owing to the fact that the bottom rail is invariably wider than the top rail of the upper sash, the weights attached to the upper sheet will hold it tight against the top of the frame, and yet will not prevent the sash from remaining where placed when in use. If the weighting of the upper sash is not done properly, it will drop below the meeting rail, or, if locked, will throw all the weight on the sash lock, a very undesirable condition, as it will, in many cases, be almost impossible for delicate fingers to open the window when wanted. Sashes, to work nicely, should be fitted snug in their runways, not so tight, however that paint or moisture will prevent their working. Good cotton cord is better to use for hanging than hemp or manilla, as it works smoother, and, if lightly coated with hard mutton tallow when put in place, will last a long time and run quite smoothly. Of course, very little tallow must be used.

EXTRAS AND OMISSIONS IN BUILDING CONTRACTS.*

By E. H. BLAKE.

BUILDING contracts had, said the author, been described as "the most complicated and most difficult, and, in many respects, the most unjust contracts that commercial enterprise had ever been able to achieve." But the words, spoken some fourteen years ago, were hardly so applicable now. A contract to erect a building could never be a simple one, being arranged between two parties by a person who was no party to it, and yet had large powers under it, and being subject to a whole schedule of conditions. The contract might be unjust to either party. The builder might suffer from having to estimate for matters which were either in ignorance or by design left uncertain, with a view to getting comcompeting tenders; and, again plans and specifications from which a builder is expected to "erect a complete building" might in themselves be incomplete or impracticable. It was true that most architects or engineers would not shirk their own share of responsibility for imperfect plans ; but there were important cases which showed that, where they did, the law was with them. The risks to which the two parties were liable might be summed up as in the case of the building owner-excess of cost over contract price, failure of builder, and delay through weather, strikes, etc.; in the case of the builder, strikes variations in price of labor and materials, failure of owner, accidents to workmen, faulty plans and quantities and penalties. A reasonable contract reduced the element of risk to either party to a minimum. One of the most difficult matters to settle was the question of extras and omissions. The knowledge of the employer on such matters was limited, and his intentions were often not very clearly defined, even in his own mind. The architect could only advise, and act as the employer's agent ; but he had no implicit authority to alter the terms of the contract, even though the owner generally by his contract conferred large powers on him. There was sometimes a lack of confidence between architect and builder, and the contract conditions must, therefore be exactly defined.

All extras should be subject to a signed order from the architect, and the price be based on a previously deposited schedule. The avoidance of any misunderstanding should be secured before signing the contract, preferably by the care of the surveyor in taking off the quantities. The quantity surveyor's work must be exact, and could not be matter of opinion, so far as labors and materials went. There was so much to be done and used or there was not; but insufficient descriptions were often responsible for inaccuracies. The question of liability of the surveyor for inaccuracies depended much on his position and mode of appointment. The case of "Priestly v. Stone" was well known. The quantities were taken out from unfinished drawings, and the architect afterward altered the drawings and specification and submitted them with the original quantities as a basis for tendering. It was held that there was no privity of contract between quantity surveyor and builder, although in spite of this judgment it was still customary to hold the surveyor morally liable to the builder for inaceuracies. The moral aspect of the case as regards the owner who might receive work for which he had not paid, mustalso be considered. Quantities should, of course, be prepared by a qualified man, and time should be allowed for their careful completion. The author recommended that they should be made part of the contract. It was unfair to issue bills of quantities for the purpose of tendering while repudiating all responsibility for their accuracy, merely allowing a week or so for the contractor to verify them. This practice was happily dying out. It was very important that in all stages of the proceeding the employer should be kept informed of his liabilities to the quantity surveyor and to the builder. A strong opinion had recently, in the case of "Torrome v. Scott," been expressed by the Lord Chief Justice, that quantities should be taken out by an independent person. The essence of a just contract was exchange, in strict equity, of "Extras" were all works not included in a cash for kind. contract, for which instructions were given. "Omissions" might occur where quantities formed part of the contract. "Extras" might arise through exigencies not previously known Where they do not form part of the contract, works to exist. necessary to complete were not extras, though not shown or specified. In this connection the author would refer members interested to the cases of "Sharp v. San Panto," "Thorn v. London Corporation," and "Bottoms v. York," which were all instructive from various points of view. It has been held again and again and again by the Courts, that the plans, specifications, etc., were in the nature of information enabling the builder to

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