

11. Much difference of opinion exists among the builders, with regard to the comparative merits of cast or wrought iron fingers or guards. We do not suppose that our judgment will settle conflicting opinions on this point; yet we deem it proper to say, that we believe the cast iron finger to be the best, on the whole. We think that it is better that a guard should break, than bend. In the latter case, the friction will be very greatly increased, consuming an increase of power, which is expended in wearing out and deranging other parts of the machinery. Many country blacksmiths are not qualified for such a job, and make it worse by their attempts to repair it; while any farmer can take off a broken guard and replace it by a new one in a few minutes. It is probable, however, that considerable improvement may be made by a proper mixture of metals in casting them. The guards in Allen's machine seem of a very excellent quality, and we are informed that they were produced in this way. We think, too, that Allen's concave knife is a step in the right direction for reducing friction, and for diminishing the weight of the knife without lessening its strength.

12. We noticed with pleasure, on some machines, contrivances for increasing the comfort and security of the driver. Ball, Aultman & Co., R. L. Allen, Seymour & Morgan, and some others, have comfortable spings to the seats, which make the work of the driver much less laborious. We think when the cutter-bar is not in a line with the shaft of the driving-wheel, it should be in *advance* of it. There have been many instances, where the driver has been shockingly mangled by the knife, being thrown from his seat. This would not have occurred if the knife had been before the driver's seat.

13. We would invite the especial attention of builders to the wedge-form cavity in the guard under the knife, as described on page 43 in connection with Halckenbeck's mower.

14. We speak of the cam principle with diffidence. The simplicity of structure which it admits is a strong temptation to use it; yet it will be seen from Table D, that the ease of draft which ought to follow simplicity of structure, has not been attained in practice. Pruyn & Lansing required 446 lbs.; F. J. Frelinghausen's, 492 lbs.; and Caryl's 493 lbs. Or, according to the more accurate statement on Table E, Pruyn & Lansing required 8.494 lbs.; Frelinghausen, 8.946 lbs.; and Caryl, 8.502 lbs., per inch of cut to drive them.

Notwithstanding this result, we are not quite incredulous with respect to the application of the cam principle to the propulsion of mowers and reapers, and we would invite the attention of inventors to the utilities which may lie latent in the cam. There was much in the mechanical arrangement of all these machines which may account for their tendency to expend their power in hammering themselves to pieces, without charging it to the fundamental principle of the cam. Accuracy of adjustment, the avoidance of loose play between the respective parts, and smoothness of surface where the parts rub or roll on each other, are indispensable to perfect cam action; yet, all these points were neglected in all three of them.

Pruyn & Lansing's machine complied more nearly with these conditions than the other two, and the result is seen in its reduced draft. We think if this machine were altered from a straight to a curved zig-zag\*—if there were increased precautions against the intrusion of dust and dirt—if larger friction wheels, made of composition metal, were employed, and more accurately adjusted to roll on the face of the cam, without any play—if the length of vibration of the knife could be shortened without injury to the cutting power—and if the momentum of the knife could be arrested just before changing its direction, by an elastic spring placed at either end of the machine, we might hope for a decided improvement over everything now in existence.

15. A difference of opinion also exists with respect to the advantages of wooden and iron finger-bars. In our opinion, iron-finger bars, (which can be made much narrower than wooden ones,) are better adapted to the cutting of *fine, short* grass than wooden ones, on which, from their greater breadth, the grass piles up and tends to clog the knife; but in ordinary grass, we prefer the wooden finger-bar, as in case of accident farmers would be able to repair or renew it without recourse to the mechanic's shop.

16. When grass is long, and the wind is blowing in the same direction that the machine travels, it is very difficult, if not (in some cases) impossible, to cut without a reel. In other cases, it is much better to cut without one, as the grass after cutting, is in a much better condition for drying. We therefore consider it desirable that mowers should be furnished with reels which can be quickly and easily removed and replaced. They would then be enabled to cut under all circumstances.

\* I have not had time to investigate the ordinates of the proper curve, but presume, from analogy, that it would be a cycloid.