

place on level ground, where the waste of force is masked. We would invite the attention of mechanics to the remarks already made on this topic, believing that attention to them on their part, will lead to great economy of power.

3. We believe this trial has shown that grass is cut more easily when the angle of the apex of the knife is obtuse, or the angle between the cutting-edge and the base of the knife is acute - since it then approximates more nearly to a saw cut, and less to a chisel cut. If we are correct in this, very many of the machines may be improved, as may be seen from table F.

4. It seems clearly settled by this trial, that a broad, wedge-formed guard is superior to a straight one, for the reasons assigned on page 52. It is obvious that when the grass is drawn over at an angle of forty-five degrees, as it is in some machines, the area of the cut section is much greater than when cut standing perpendicularly, and must therefore absorb more power. The cut in the latter case is much more analogous to the saw, and it affords a much better protection against stones. We think it a great error in Prun & Lansing's machine, that the lower part of the guard is smaller, (narrower) than the upper part. The effect of this arrangement is, that the force of the cut is expended on the root of the grass, which tends to draw it out and break the fibres, which will either kill it, or retard its starting in the fall. This effect is less apparent when the knife is sharp, but will become very serious when it is dull. The tendency, however, exists at all times.

5. It has long been understood by mechanics, that internal is better than external gearing, where it can be applied, because the larger wheel more nearly coincides with the smaller in form, and therefore brings a greater number of cogs in contact. We were therefore surprised to see so many machines geared externally, and would recommend a change in this respect.

6. Nothing has been more clearly demonstrated, in our judgment, than the value of balance-wheels in promoting the smoothness of working of the machines, where they were properly adjusted and judiciously located. Some were too small to act well at the velocity with which they worked; in others the weight was not sufficiently distributed to the rim, and in others the counterpoise was so placed as to increase, rather than overcome the momentum of the knife. We recommend to all builders of these machines, a careful series of experiments, with a view to ascertain the exact size of balance wheel which will best overcome the momentum of the knife at their respective velocities. We also advise that the wheels shall be located near to the pitman, as a remote location gives rise to a twisting and irregular action on the journals.

7. Most inventors seem aware of the value of a light knife in diminishing the momentum, although we think there is much room, by the use of an improved quality of materials, to reduce its weight still farther; but some seem to forget that the weight of the connecting-rod, as well as the weight of the knife, is an element of momentum. Some of these were very unnecessarily long and heavy. A reduction of these dimensions will therefore be followed by a material reduction of power expended.

8. It is often overlooked, that time, as well as force, is an element in the consideration of power. A variation of ten pounds in the draft of two machines is looked upon by many as a mere bagatelle. It is not considered that this force is extended throughout every second of time of working. If, then, the two machines work for ten hours, the difference of force is not represented by 10 lbs., but by that number multiplied into the number of seconds in 10 hours, viz: 10 h. \times 60 m. \times 60 sec. \times 10 lbs. = 360,000 lbs. Our excuse for an allusion to a principle so entirely elementary, must be found in the fact that it is so strangely overlooked by many farmers and mechanics; and we hope that the remark may stimulate inventors to attempt every possible reduction of force, even if it be apparently very small—being assured that in the long run, it will be very considerable.

9. It seems fully settled, that the most desirable position of the knife is in a line with the centre of the driving-wheel, as in Ketchum's machine.

10. It is also very clear, from this trial, that the cutter-bar should be flexible, as connected with the frame of the machine. The grass is cut more evenly, and side draft is prevented; for when the knife on a stiff machine, rises over a knoll, or other obstruction, the pressure on the surface of the ground increases the resistance and causes side draft. For this reason, those machines which have flexible fastenings of the cutter-bar to the frame, have the least side draft, provided the draft is properly attached. Hence, such machines as Ball & Aultman's, Kirby's, and the last made mower of Ketchum's, &c., are to be preferred in this respect.