

built up of several pieces bolted together. The wheels are of cast iron, 31 to 34 inches high, $3\frac{1}{2}$ to 4 inches wide, and are provided with horizontal and vertical lugs on the rims to ensure good driving contact with the ground. The wheels communicate their forward motion to the shaft and the main gear-wheel through a ratchet and spring-pawls on the inside of the hubs of both wheels, Fig. 3, Plate 2. From the main gear-wheel the motion is communicated to the cross-shaft by various arrangements of spur and bevel wheels and pinions, giving a rapid motion to the crank, and thence to the knife through the connecting-rod. The connecting-rod is long, and is in some machines made of wood, the variety used being well-seasoned second-growth hickory, and in others it is of wrought-iron or steel. It is attached to the knife-head and to the crank either by a ball and socket joint, Fig. 4, or by a hook and eye, Fig. 5. The speed given is in a ratio of from 55 to 62 vibrations of the knife to one revolution of the drive-wheels. A lower speed than this would not cut rapidly enough in heavy grass to prevent some of it blocking the action of the machine, and a higher speed would overheat the bearings. The cutting apparatus, consisting of the heavy steel cutter-bar, the fingers or guards, and the sectional knife, is attached to a hinged portion of the main frame, called the hanger, by large bearings, and is supported at each end by a shoe with either wheels or steel runners. It is made of different lengths to cut a swath of from $3\frac{1}{2}$ to 6 feet wide, and the width of tread between the drive-wheels is proportionately wide—from $3\frac{1}{2}$ to 5 feet—to give the machine stability. The knife is held tightly against the guard-plates by several clips, to make a close shear cut and to prevent short and soft grass from getting between the knife and the bar. After much use, the constant strain on the cutting apparatus has a tendency to make it sag backward and to throw the knife and the connecting-rod out of line, although every effort is made by the use of large and strong bearings to prevent its doing so, and if this were not remedied the knife would cut into the fingers and soon the entire apparatus would be ruined. A strong brace is therefore provided, connecting the hanger with the solid tubular part of the main frame, which can be adjusted to take up any wear, and keep the