

Fig. 10 shows a system on the same principle as that of Fig. 9, except that the air is distributed at the side-wall, instead of at the floor. This plan is suitable for old stables in which the pipes cannot be laid along or under the floor.

Fig. 11 shows the system of ventilation in Mr. Tillson's stables at Tillsonburg. It differs from that shown in Fig. 9 in the following particulars:

1. The inlet pipe, instead of being placed immediately above the roof, stands by itself at some distance from the barn, and the horizontal pipe lies eight (8) feet below the ground until it enters the stable, when it passes just below the floor of the passage. In this way, the air before entering the stable is warmed in winter and cooled in summer. At 8 feet below the ground, the earth temperature varies but slightly through the year, and the sub-earth duct brings the air nearly to a constant temperature.

2. The air is distributed by lateral pipes 9 inches in diameter and 8 feet apart, alternately on opposite sides of the main, and opening out at the floor level just in front of the mangers.

3. The foul-air shafts at the ceiling are supplemented by flues built into the wall about 20 feet apart. Each flue has a square or oblong opening near the floor, and a similar opening near the ceiling. This addition, while it increases the cost, increases the efficiency of the ventilation.

SIZE OF PIPES, SHAFTS, ETC. The inlet pipe is 24 inches in diameter, and is made to do duty for 40 cattle—an area of 11 square inches for each animal. This is less than half the area that has been mentioned as desirable. In this particular case, the amount of air might be doubled with but slight additional expense, by erecting a cowl at each end of the horizontal pipe, and sealing the latter at the middle, so as to virtually make two inlet pipes.

The *laterals* are 9 inches in diameter, and supply air to four animals, which is equivalent to a $4\frac{1}{2}$ inch pipe for each. Such a provision is ample on a cold day, but not so on a calm mild day. It is best to supply sufficient space for the lowest rate of supply, since on a windy day, when the rate of supply is greater, the area can be diminished by shut-offs.

The *ceiling outlets* represented in Fig. 11 are in the original 4 feet square,—much larger than is necessary for ventilation, but convenient for the secondary use to which they are put, namely, to serve for feed-chutes. Mr. Tillson informed us that on account of the large size of these ventilators, a down draft was sometimes felt coming from them. In order to prevent this, and at the same time to allow of their use as feed-chutes, it would be a good plan to build them the size required for the second purpose, to a sufficient height, and then reduce them to about 18 inches or 2 feet square.

The *flues* are built in the wall and extend like chimneys well above the eaves. They are not essential to stable ventilation, but undoubtedly improve it, especially in large crowded stables. The openings near the floor provide a way of escape for disagreeable odors from the gutters, at