Conducted by Professor P. S. Rose

# Practical Talks to Threshermen

Talk No. LI.

It is not an easy matter to design a separator frame which will be substantially braced and which at the same time will be clear and free at all points for the placing of the racks and other moving parts and for the passage of the straw. In all framed structures the completed edifice is composed of a series of triangles, since this is the only figure that will maintain its form and combine the maximum strength with the use of the least material under any system of loading. As evidence of the truth of this statement, it is only necessary to call attention to the fact that all bridge and roof trusses are built up of a series of triangles disposed in such a manner that every member is either in straight tension or compresion and with no bending or shearing stresses in any member except in the lower chord.

A separator frame built in the same manner as a bridge would have maximum strength and would hold its shape almost indefinitely. The ideal is hard to realize, however, in practice, on account of the fact that we have to deal with a box-like structure which is subjected to lateral stresses as well as to vertical stresses and it is impossible to make use of cross braces running from corner to corner through the middle of the machine. This necessitates using rather heavy bed pieces and both through rods (as shown in the last lesson) and angle irons at the corners. All of these, when properly disposed, will keep the frame in very good shape and thus prevent the working parts from getting badly out of line, but in order to obtain such satisfactory results the designers are obliged to exercise exceptional care and good judgment.

Figures 93 and 94 on this page show how different designers have attacked the problem and the solution they arrived at. These views, unfortunately, do not show anything but the side frame, leaving the members out that tie the two sides of the machine together. These, however, consist in every case of strong cross pieces attached by bolts and mortised to the side frame, with usually angle braces at the corners of the bottom member.

The front axle of the machine is attached by means of a pivot bearing while the rear anxle is bolted rigidly to the framework, thus

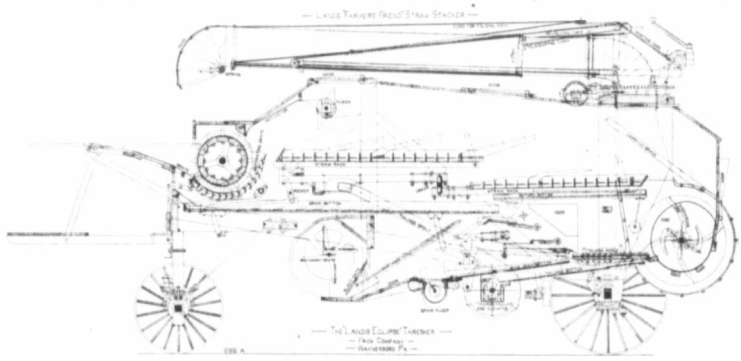

Figure 93

providing three points of support just as in all other road vehicles.

The stresses on the framework of a separator are occasioned by rough roads, by transmitting power through belts from one pulley to another, and by the natural vibration of the machine out of level. The first of these strains, that due to rough roads, is perhaps the most severe, since the lurching of the machine sidewise causes heavy lateral strains which the machine is least able to bear without distortion. These strains increase rapidly with fast road speeds, especially if the roads are a little rough. In all cases they can be greatly minimized by rather slow, careful driving.

The normal working strains being in the direction of the bed pieces and main frame, in most cases, are not very severe and are unavoidable. They can be reduced to a minimum by running the machine at the correct speed and keeping all belts at the right tension. The wear and tear due to the natural vibration of the machine tends to disturb the adjustment of its parts and makes it necessary for the operator to keep careful watch lest nuts shake loose, or any vital part of the machine become misplaced.

Running with the machine out of level is another fruitful source of trouble, since it throws the weight of grain to one side of the machine and loads the bearings on the lower side of the machine. A separator is a complicated machine; there are a large number of parts to keep in adjustment and it requires good judgment and great carefulness on the part of the operator to keep everything running smoothly. The operator should be a close observer and should make careful inspection of his machine every time it is stopped. When it is running he should go over it frequently also, watch the bearings to see they are not heating, note whether or not all pulleys are running at the proper speed, and judge by the sound the machine makes if it is running right. It takes a cool, level headed man with good judgment to be a first rate separator man, for, in addition to understanding thoroughly the principles of separation in all the various kinds and conditions of grain, he must be a good mill man or mechanician.

The life of a separator is not easy to estimate. In Western Canada between four and five years is considered the average time a separator will last. Even there, however, it is not uncommon to find machines from ten to fifteen years old which have seen service every season and are still doing good work. It would seem, therefore, barring accidents, that separators should be made to last ten years on an average if handled by careful, competent operators.

Many separators are injured more in the first few hours of operation than in a normal season's run because of lack of care in putting everything in first class shape. Here is a place where it truly pays to make haste slowly.

After a long journey by rail the bearings are generally full of cinders and need cleaning. The writer remembers going once to repair a new machine that had run only a couple of hours and found the blower boxes melted out because the operator had neglected to clean out the cinders. Here was an accident that there was no excuse for whatever. Some things are hard to foresee but it is not hard to realize that the bearings of any machine need attention if the machine has travelled on an open flat car sev-

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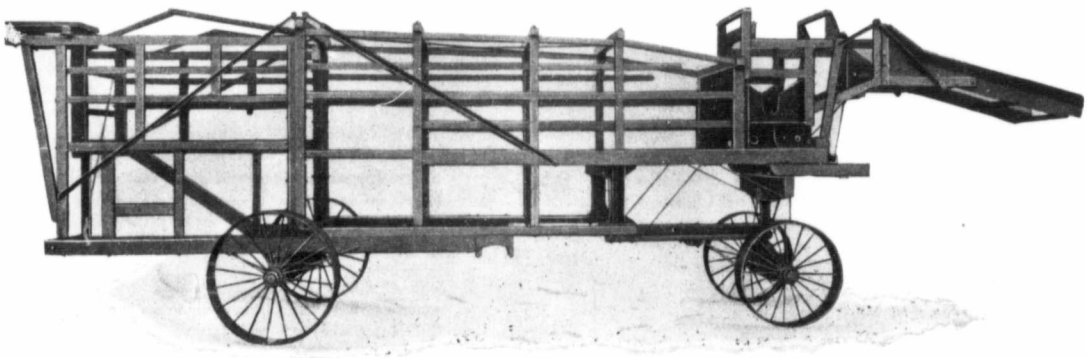

Figure 94