

succeeded in constructing mechanism by which horses can both reap and bind into neat sheaves our bulky and storm-broken English corn, the Royal Agricultural Society have offered two prizes of £100 for the best, and £50 for the second best sheaf-binding reaper, the binding material to be other than wire. The competition commenced a few days ago on farms near Shrewsbury, offering some 150 acres of wheat, oats, and barley for the experiments. The judges were Mr. Mason Cooke, Mr. W. Scotson, and Mr. T. Bell, with Mr. Courtney as engineer. On a field of Webb's Prolific Black Tartarian oats, on the farm of one of Earl Powis's tenantry, sixteen machines put in an appearance—three of Howard, of Bedford, three of Hornsby, of Grantham, two of Samuelson, of Banbury, three of M'Cormick, two of Walter A. Wood, one of Kearsley, of Ripon, one of the Johnston Harvester Company, and one of H. J. H. King, of Newmarket, Stroud. In the first runs with three-rod plots each, Mr. King's original and ingenious "narrow-width" machine proved itself too heavy in draught for the horses; and the machine of the Johnston Harvester Company met with so many misfortunes that the judges ruled it out of further competition. The contest was renewed between the remaining 14 machines. The crop was of Webb's Challenge White Canadian oats, well headed, with moderately short straw, but very tangled and storm-broken, though scrupulously clear from weeds. Next day the same 14 machines competed in an upstanding crop of red wheat, two acres to each machine; details as to time, area, stoppages, sheaves missed tying, and so on, being noted. With the exception of the machines of Walter A. Wood, the packing, knotting, and delivering mechanism is in all cases a modification, more or less original, of the so-called American Appleby binder. All the machines have acquitted themselves well, the advance made since the Derby trials in 1881 being remarkable. The number of sheaves missed tying is quite unappreciable, alike with hemp or Manila twine, costing 1s. to 2s. per acre. One feature of the present competition is that though the Americans have had the longest experience with binders, the English makers have now come up thoroughly abreast of the Transatlantic pioneers. One point authoritatively established by the trials is that these string-binding reapers can deal effectively with any crop, whether laid or twisted, which is not in too prostrate and rough a condition to be cut by an ordinary self-raking reaping machine. One novelty is the carrying of the bound sheaves till three are collected and then let fall together, side by side, upon the ground. By timing this delivery with his foot on a lever, Hornsby's man drops the triplets of sheaves round after round, so that the whole lie in straight rows exactly convenient for handy stooking. Another novelty is Samuelson's "low-level" binder, in which the cut corn is conveyed sideways by web to a binding table but slightly higher than the cutter-platform—that is, the sheaves are tied and delivered without the stuff being raised over the main wheel between two webs in the ordinary way. It is alleged that this form of construction is better adapted for sloping lands, and that the machine can be sold at a low price.

For the Society's £25 prizes for independent binders, or machines which pick up loose sheaf bunches or swathes after the cut corn has lain for some time to wither, two entries appeared. Kingsford, Fairless, and Co., of Kingston-on-Thames, were not successful in convincing the judges during a short trial of the value of their invention, neither were the Notts Fork and Implement Company, of Ranskill, Bawtry, more fortunate, though they certainly showed the ease and smartness with which their apparatus can pick up loose sheaf-bunches off the ground and tie with the band in any desired position round the sheaf. There may be a fu-

ture for both these inventions, upon which much time and money have been bestowed.

As an illustration of the ingenuity existing among some tenant-farmers it may be mentioned that in the field was one farmer, Mr. N. Rix, of London Colney, who last year cut 17 acres of wheat with a self-raking reaper drawn by a 6 horse power farm locomotive, the guiding upon a tolerably lry surface and alike up and down hill being accomplished without any difficulty.

The trials were concluded on Wednesday. Messrs. Hornsby's machines won the first prize, and Messrs. Howard's machines the second prize.

### Exhausted Soils.

G. C. A. asks. "Can good sandy loam soil (which is in grass, but run down) ploughed the coming spring and sowed to grass-seed only, be made to produce a good crop of grass by sowing fertilizers broadcast? If so, what kind do you consider the best, and how much to the acre? You can answer in *THE WATCHMAN*, as I read it every week. The land is in Duxbury, Vermont."

REPLY BY AGRICULTURAL EDITOR—Yes. Any of the standard commercial fertilizers may be used, or one of the formulas lately given in these columns. Fifteen bushels good hardwood ashes and five hundred pounds finely-ground raw bone to the acre, harrowed in before sowing the grass seed, has done first rate with us. From one such piece we sold the grass, guaranteeing it to yield two tons to the acre, for three successive years. The purchaser weighed the hay from one acre the first year, but took it without weighing afterwards. The fourth year it was ploughed and planted to Brooks' Seedling potatoes. The yield was not accurately measured, but we remember that the men who dug them said they were too large to be merchantable. Many bushels might have been picked up averaging a pound to each potato.

*Vermont Watchman.*

### The assimilation of atmospheric nitrogen by plants.

*By W. O. Atwater.*

It is almost a universal opinion that free nitrogen is not assimilated by plants. He referred to the classic experiments of Boussingault, of Lawes, and Gilbert and Pugh, which, commonly regarded as decisive, may have been performed without consideration to certain conditions. Experiments made by the author show that at any rate certain plants grown under normal conditions do assimilate nitrogen. Peas grown in sand which had been purified by burning and washing, and to which were applied nutritive solutions containing known quantities of nitrogen. The amount of nitrogen supplied to the plant plus the amount contained in the seed was compared after the experiment with the amount given by analysis of the plant and the residual solution. The excess of the latter amount over the former, which in some cases was excessive represented the nitrogen acquired from the air.

Section B, Chemistry, will finish its work to-day and will not meet to-morrow.