Practical Wheat Growing

Presented by

Wm. Deering & Co.

Manufacturers of

Binders, Reapers & Mowers.

Chicago, U.S.A.

Rogers & Johnson, Lith. Chicago

WM. DEERING & CO.,

CHICAGO, U. S. A.,

WILL MANUFACTURE FOR 1886

The Deering Standard Twine Binder, 5, 6, 7 and 8-foot cut,
The Deering Junior Twine Binder, 5 and 6-foot cut,
The Deering All-Steel Binder, 5 and 6-foot cut,
The Deering Light Reaper,
The Deering Mower, 4-foot $3\frac{1}{4}$ inch and 4-foot $7\frac{3}{4}$ inch cut,
The New Deering Mower, 4-foot $3\frac{1}{4}$ inch and 4-foot $7\frac{3}{4}$ inch cut,
The Deering Front-Cut Giant Mower, 5, 6 and 7-foot cut,
The Deering Rear-Cut Giant Mower, 6 and 7-foot cut,
The Warrior Mower,
The Deering Binder Trucks,
The Deering Flax, Clover and Timothy Carrier,
The Deering Steel Bundle Carriers,
The Deering Binder Canvas Covers,
The Deering Binder Twine.

A descriptive circular about all these machines, and special circulars about each machine sent on application, free of postage.

PRACTICAL

WHEAT GROWING.

A MANUAL OF SYSTEMATIC CULTIVATING,

Including Soils, Seeding, Improvement of the Crops, Injurious Insects and Vegetable Parasites, and proper Harvesting, Shocking and Stacking.

By JONATHAN PERIAM,

Author of American Encyclopædia of Agriculture, etc., etc.

ILLUSTRATED.

PUBLISHED BY

WILLIAM DEERING & COMPANY,

CHICAGO, ILL.

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PUBLISHERS' PREFACE.

This little manual is sent out in the hope that it will be of advantage to many young farmers, and be of interest even to the most advanced. To jog the memory in relation to what is already known, often gives rise to profitable thought. The wheat crop is of so great importance that if this little pamphlet may serve to increase the average by a few bushels per acre, through improved methods and improved machinery, the publishers will feel amply rewarded in incurring large cost involved in the issue of many thousands, intended for free distribution among the intelligent progressive farmers of this great country.

It is impossible that the publishers of this manual should have been engaged through themselves and their predecessors for twenty-eight years in an occupation so closely bound up with the interests and life of the farmers of the country, without having gained a strong sense of the identity of their fortunes with those of the farming community. We have grown with their growth, and strengthened with their strength. We have seen their thousands of acres become millions, and they have seen our annual production of hundreds of machines become tens of thousands. We would not burden down our small offering to them of this little manual, with any undue reminder of the part we have played in their progress, yet we are sure that we can not be reproached with improper self-congratulation in remembering that we have been first to recognize every want that their growing territory, and their own intelligent progress have rendered imperative in the harvest field. In 1858 the (Deering) Marsh Harvester reduced the force required for gathering a dozen acres of grain from eight to three men, to be followed in this long step of progress by others, only after an interval of fifteen years.

In 1875 the Deering Wire Binder reduced the three men to one, and enabled him, with reasonable satisfaction, to harvest the twelve acres of

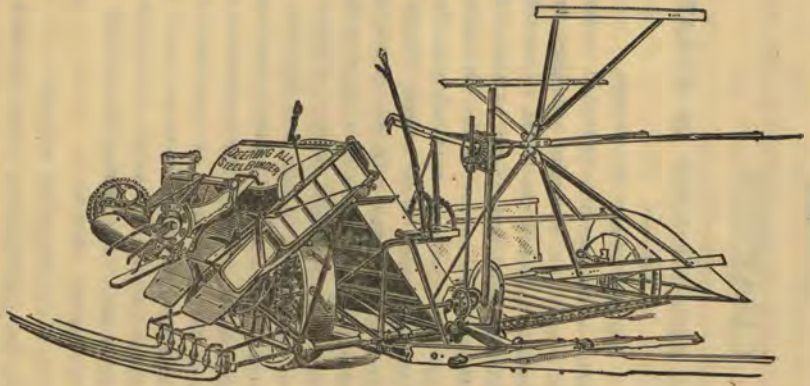
the three in little more than half the time they required for the task. In 1879 the Deering Twine Binder, the first of all those harvesting machines that have done so much to place the grain grown on the Western prairies on the tables of the poor artisan and the rich banker of London, was introduced and was so long a step of progress that it required from two to four years to enable others to understand the ready appreciation with which it was welcomed by the farmers, and to begin their imitation of its methods.

To come to the present time, the demands of the farming community (to which it is the pride of the Deering factory to hold itself keenly sensible) had scarcely been formulated in calling for a harvesting machine built of steel and malleable iron of light weight and light draft, when the Junior Deering (first of the kind) was offered them, and we are proud to say accepted as fully meeting their wants.

In the years from 1879 to the current year, from the Deering factory have gone out into the harvest fields of our own and other countries, more of those labor-saving, money-saving implements, the modern self-binders, than from any other in the world. In the pages that follow, we hope that we may, by increasing in some measure the prosperity of the farmers, do something towards repaying them for their kind appreciation of our efforts. If we appear occasionally to magnify the importance of the perfect harvesting machine to the wheat grower, we trust that it will be pardoned in the natural tendency to see in the largest light one's own part in the advancement of a good cause. In concluding, we beg that our friends, the farmers of this country, will accept the effort made by the publication of this book to stimulate their progress and to advance their prosperity, as a pledge of our purpose to advance them in every step of their progress, and as an earnest of our wish to help their prosperity by providing perfect harvesting machinery, built *upon honor* and calculated to meet their highest demands. With the expression of our sincere desire for their prosperity and profit for the season of 1886 and for future seasons,

We are—their cordial well-wishers,

WILLIAM DEERING & CO.



THE DEERING ALL STEEL SELF-BINDER.

PRACTICAL WHEAT GROWING.

CHAPTER I.

HISTORY AND VARIETIES OF WHEAT.

I. THE ANTIQUITY OF WHEAT.

The practical farmer is not specially interested in dissertations on the probable origin of wheat. Its antiquity antedates written history and its primitive cultivation is lost in the fables of mythological times. It is the one grain used from time immemorial as human food, as combining in a greater degree than any other the elements of nutrition. It was one of the grains in common cultivation in the days of the patriarch Jacob. It has descended to all nations thereafter within its range of possible cultivation. It grew with the history of the Jewish nation as their most valued cereal, as it is ours to-day; and the valley of the Nile, as one of the chief centers of ancient civilization, became the granary of the world. In our own day, the valley of the Mississippi, and especially that portion known as the Great Northwest, is preëminently the granary of the world, by comparison with the products of which those of Old Egypt would be as a small rivulet flowing into the great lakes, and the difference is in no way more perfectly typified than by the difference between the sickle of Boaz and the Deering self-binder of the present day. The cultivation of wheat has advanced with the borders of civilization always.

II. VARIETIES OF WHEAT.

Wheat belongs to the great family of plants (the true grass family), a family numbering 144 classified genera in the United States, and a vast number of species. Of wheats themselves, we have twelve re-

corded species, and varieties innumerable, of which we have nine in the United States. The true wheats all belong to the species *Triticum Vulgare.* The troublesome couch grass is one of the species. Spring wheat is known as *T. Æstivum*, and winter wheat as *T. Hybernum.* Both winter and spring wheats have varieties known as soft and hard wheats, and soft and hard wheats may be either bald or bearded.

III. SOFT AND HARD WHEATS.

The soft wheats are naturally natives of northern climates, coming to us from Great Britain, Belgium, Denmark and Sweden. Hard wheats are natives of warmer climates, as Italy, Sicily and Barbary The soft wheats contain more starch than the hard wheats, and the latter more gluten. The United States, by its peculiarities of climate, is able even in the northern sections to raise the hard wheats, the hot summer climate of the Mississippi Valley, and especially of the Northwest, being well adapted to the growth of these wheats; and the hard spring and winter wheats of this region have deservedly acquired a world-wide reputation for bread making, producing by the aid of special mills the best flour in the world. The soft wheats of the United States are grown wherever the old style milling process is in vogue, and are not much cultivated now. Most soft wheat is grown in the South. Soft wheats, from their large proportion of starch, are more valuable for conversion into starch, glucose, and are adapted to brewing and distilling. Soft wheats are known by their white starchy appearance when broken or ground down. On the contrary, hard wheats are more glossy, yellow, and inclined to granulate.

IV. WINTER AND SPRING WHEATS.

Without doubt, the original form of wheat was a biennial. That is, it required the second year to perfect its seed. Naturally, therefore, all wheat is winter wheat; but, by special cultivation, winter wheat may be changed into spring wheat, by allowing it to become swelled in the autumn, even to germination, and then planting in the spring when the soil becomes fit for sowing; the earlier the better. Some varieties suffer the change readily, while others require several years to

become converted into spring wheat. An instance of the latter case is the Clawson. The Early May or Amber may be said to have the best general reputation as a Winter wheat in the middle region of the United States. Of spring wheats, Club varieties are noted for early ripening on high dry land, while Fife does well on moister soil.

V. BEARDED AND BALD WHEATS.

There is no doubt but that the original type from which cultivated varieties of wheat have been improved had awns or beards. An evidence of this is the fact of bald wheats often reverting and partially or wholly acquiring beards. The generic character of an animal or plant can never be changed by breeding or cultivation. Either may break into varieties, but true hybrids are notably infertile. Form and other minor characteristics are easily changed, hence the endless variety of the shape of head, color and habit of growth. As a rule, the wider the departure from the original type, once the departure has been made permanent, the weaker become the constitutional powers of the animal or plant. The reason for this is that the fixity or permanence must be obtained by breeding in-and-in. This in animals and plants tends to weaken the constitution and render it delicate. Yet this does not always follow; in relation to notable characteristics of wheat and of bearded-leaved plants in general, bearded wheat when in head suffers sooner from the effect of frost than bald wheat, and this forms a well-known law of nature that rough, uneven or pointed surfaces radiate heat faster than smooth or glossy surfaces. Hence bearded wheat when in head would be frozen sooner than bald wheat. On the other hand, there is a well-founded opinion that bald wheat will not stand severe cold as well as bearded varieties.

Again, bearded wheat because of radiation attracts dew more strongly than bald wheat. The bald or more strictly beardless varieties have divided into whitish beardless varieties and reddish beardless varieties. Of the beardless well-known varieties, the old fashioned red chaffed, square-eared, with a round plump grain, is best adapted to rich, sheltered soils, especially so as it is apt to shed its seeds in high winds. Velvet or woolly-eared wheat has a white chaff and is downy, as its name indi-

cates, with close, compact ears. It is adapted to rich loamy soils. The bearded varieties are divided into whitish bearded, reddish bearded, and tinged varieties. Of the bearded varieties well-known, the Genessee Flint, an early ripening, nearly rust-proof, prolific variety may be noted. It was adapted to a variety of soils, but was objectionable on account of its rough, bristling beards.

VI. REPUTABLE VARIETIES.

Varieties are so constantly being introduced and dying out (generally from want of attention in the cultivation), that it would be out of place in a work of this kind to specify comparatively untried kinds. But, as showing the range of varieties in several wheat states, some prominent exhibits of varieties at the Centennial Exhibition will be instructive. The list is taken from a special government report, not generally disseminated. It may be taken for granted that these exhibitions embraced the best and most prolific varieties of the several districts mentioned, and the list is given as a study of reputable varieties, most of them retaining their reputation to-day, and furnishing a good field for selection for the farmers of the various districts mentioned.

In the New England States, we find the Lost Nation, Tappahannock and Lancaster Red Chaff the most commonly cultivated; while samples of Arnautka, Canada, Hybrid, White Laisette and White Italian occur. New York adds Diehl, Treadwell, China Tea and other varieties. In the remaining Middle States and Maryland, Virginia and North Carolina we find Fultz and Mediterranean grown; Tappahannock, White Canada and Golden Chaff are also represented. Ohio has sent nearly the same wheats as are grown in Pennsylvania, only one name not previously occurring, that of "Todd" wheat, being observed. Indiana and Illinois grow Lancaster; Michigan, Amber, Tappahannock, Odessa Red, Fultz, China, Missouri, Velvet, Early Oran, Scotts, Egyptian and two or three other varieties. In the Missouri collection we still find Fultz and Odessa, together with New York, Flint, Independent Spring, etc. Iowa contributes Rio Grande, Canada, Fife and White Chili. Among the varieties grown in Minnesota are Scotch Fife, Rio

Grande and China Tea before mentioned, with the addition of Eureka, Early Sherman and White Hamburg. Michigan sends Diehl, Gold Medal and White Mountain.

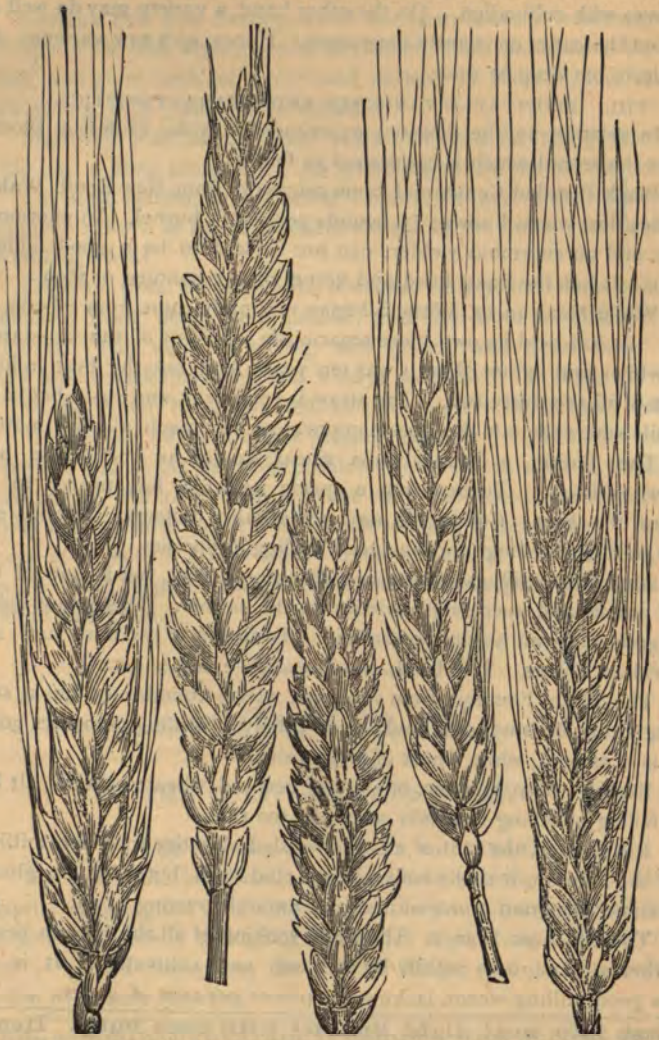
The wheats of Kansas and Colorado, approaching in appearance those of California, are White Colorado, White California, Turkey and Colorado Red Chaff, while Nebraska gives the names of Priest Spring, Otoe and Russian Club. Among the wheats of the Pacific coast, principally white wheats, the White Australian appears to be the general favorite. The White Chili is also grown, and such varieties as Canada Club, Jones, Propo, Bride of the Butte and Nonpareil are represented in the collection. From Texas and New Mexico we have Sonora and Zaragoza.

It will be seen that out of the vast number of varieties named in books on the subject, as of value, the number practically found worthy of general cultivation in a locality is few. Hence, in the selection of varieties for cultivation, the practical man will be wise in adopting those found valuable by his neighbors, on a soil similar to his own.

VII. VARIETIES PROFITABLE FOR THE FARMER.

In the cultivation of wheat, the farmer must have reference to several points of excellence. However good a variety may be, if it shell badly in harvesting, when ripe (largely prevented by using a Deering binder), as does Rio Grande or Russian wheat, if it be inclined to weak, soft straw, and consequent liability to rust or crinkle, as does the white Siberian; if it be very late in ripening or possess the disability of ripening unevenly (partially prevented by very thick sowing); if it have a soft spongy grain, or is especially liable to the depredations of insects; or if, being a winter wheat, it kills or heaves badly, it should be discarded.

Prof. Blount of the Colorado Agricultural College, in a report to the United States Government, in 1882, gives a detailed history of careful experiments made with various wheats from different countries. A condensed account of some of these will be valuable as indicating good and bad points in wheat, either spring or winter, and is given below. It must be recollected, however, that a variety which may not do well at first, often



TYPES OF BALD AND BEARDED WHEAT.

improves with cultivation. On the other hand, a variety may do well at first, but thereafter constantly deteriorate. Hence, with new varieties, do not dip in too deep at once.

VIII. PROFITABLE VARIETIES AND CHARACTERISTICS.

In relation to the varieties experimented with, Professor Blount makes the record which is condensed as follows:

Black-Bearded Centennial came originally from New South Wales. The heaviest wheat known; 74 pounds per struck bushel. An enormous feeder and an enormous yielder; can not be said to be a good milling wheat. It has the finest head and kernel of any handled or seen.

White Mexican *vs.* White Siberian originally came from Siberia, in Asia. It has held its own more tenaciously than any of the standards. It is whiter and lighter than it was ten years ago, but the best milling wheat of all the thirty-two. The straw is very weak and rusts badly on all soils where there is the least dampness or too much alluvial matter.

The Judkin, a Pennsylvania wheat, comes as one of the best winter varieties. Turned into a spring wheat, it has proved to be among the best. Color red, and remarkably uniform. Strong, stiff straw, a little too long, and has good milling properties.

Australian Club exhibits poor milling properties, but is one of the most prolific and successful varieties for the farmer. Has straw, color, and grain that can hardly be excelled. Is no kin to the hard and soft Australian wheats. It is hard, and has a large amber kernel.

The White Fountain from Montana yields abundantly, has a stiff, strong straw, does not rust, and ripens evenly. Milling properties good, and is a smooth, white wheat of great value.

Russian, from Moscow, one of the best red wheats proved. It has one failing—shelling too easily when cut too ripe.

Rio Grande, the best of all the bearded varieties tried for milling. Like the Russian, it shells badly, being clad with but a single glume. Sometimes the grain grows without any natural covering at all.

Touzelle, from France. The finest looking of all the French bearded wheats. Improves rapidly by selection and cultivation. It is not yet a good milling wheat, lacking the proper per cent of gluten.

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tallest into neat tight Bundles with even butts. Heavy

German Fife, from Saxony, tested one year, shows it is unexceptionally one of the best wheats grown anywhere. Not handsome, but very strong, and good both for farmer and miller. A bearded, red variety, straw strong, with grain well protected.

Improved Fife has for three years exhibited no failing whatever. Of the best milling properties. An improvement on the old Saxon Fife.

The Lost Nation, from Chester County, Pennsylvania. The three tests given show it to be an excellent variety for the farmer, and a pretty fair milling wheat.

Clawson, from Pennsylvania, a winter variety, has done well, and commends itself, being very prolific, and free from all diseases and accidents. The straw is strong, well glazed, and never falls. The heads are remarkably long, and always well filled. It does not "kill out" in the winter, but grows well, and holds green remarkably well.

Hedge Row White Chaff is properly named. It shows fair milling properties, and so far as being profitable in the field there is no doubt. Straw coarse, stiff and rough, and the chaff holds its grain tenaciously. It is so hard to thrash that it is difficult to clean it thoroughly. A good variety to cross with a finer wheat that shells easily. Hedge Row Red Chaff is, in all respects, like the other, with the exception of the color of its chaff and grain.

CHAPTER II.

THE CULTIVATION OF WHEAT.

I. THE RANGE OF WHEAT CULTIVATION.

The profitable territorial range of wheat growing may be said to comprise those regions where neither great heat nor drouth prevail during the period of growth preceding the period of ripening. These conditions are found throughout the United States and in the southern portion of British America.

grain, as well as light grain, is handled with perfect ease by

Winter wheat is grown, first, in those portions of this territory where the climate is so mild as to prevent serious freezing, and especially in regions of firm soil, containing comparatively little humus; and second in those sections which are covered in winter by even a very moderate quantity of snow.

South, the limit of winter wheat cultivation is the highlands of the Gulf of Mexico and the plateau lands of Mexico. On the Pacific slope, winter wheat makes its growth during the winter, and is cut in late spring and early summer. Near the Gulf of Mexico and in some portions of Mexico the harvest commences in May, and the harvest swath travels north an average of twelve miles daily, to the music of the click of the sickle of the Deering binders, until it is lost, in September, in the forests of British America, the northernmost limit of spring wheat production lying in the yet unexplored forests of Canada and the Northwest Territory. Against the too sudden ripening of the most southern climate, as against the early blighting frost of the most northern, the swift and sure work of the Deering binder makes a safe protection.

Spring wheat is grown where an absence of snow during winter renders the wheat, if sown in the autumn, liable to be winter-killed.

In the Northwest Territory, wheat has been profitably raised in sixty degrees north latitude, and 122 degrees of west longitude, and on the Pacific coast wheat, undoubtedly, may be raised in a much higher latitude. East of the longitude mentioned, the line of cultivation deflects southward, the mean temperature of the Dakota, Minnesota and Manitoba regions, from March to September, corresponding measurably with that of the winter wheat regions of the South from August to July.

II. WHEAT SOILS.

All soils will not raise wheat. A soil filled with vegetable matter (humus), while it produces much straw, gives little grain, and in the case of winter wheat, is almost sure to produce winter-killing, by the heaving of the soil in thawing and freezing. Wheat requires a firm, compact soil, worked to a fine tilth as to its surface. Hence, in a soil inclined to be spongy or soft, every possible means should be taken to

compact it, except in relation to its surface tilth. Soil produced by the disintegration of slate and granite rocks is among the best wheat soils, and those largely composed of sand the worst. Of the first class are the loams and clay soils of the wheat region of the West and Northwest. The addition of a large amount of vegetable matter, though it makes the best corn lands of the middle prairie regions, is, as a rule, unsuited to wheat, unless special preparation is added.

III. CLASSIFICATION OF SOILS.

It is proper here to define precisely what is meant by clay, loam, sandy soil, etc. A soil may be largely composed of sand, and yet be not only highly fertile, but enduring. The sandy soils of Michigan are among the notable examples of the fact, as being fine wheat soils. As a rule, such soils will be found resting on a friable and extremely fertile clay. On the other hand, a tenacious clay may be unfertile and yet hold within itself the elements of fertility in a high degree. Many clay soils are unfertile simply because they hold too much moisture. The following table, the classification being that of Boussingault, will show at a glance various soils adapted to cereal grains and their composition.

Soils according to Composition.	How Designated.	Clay.	Sand.	Lime or Chalk.	Humus.
Clay with humus	Rich wheat land	74	10	4	11 5
" " "	" " "	81	6	4	8.5
" " "	" " "	79	10	4	6.5
Marly soil	" " "	40	22	36	4
Light soil with humus	Meadow land	14	47	10	27
Sandy soil " "	Rich barley land	20	67	3	10
Argillaceous land	Good wheat land	58	36	2	4
Marly soil	Fair wheat land	56	30	12	2
Argillaceous land	" " "	48	50		2
Stiffer " "	" " "	60	38		2
Clay	" " "	68	30		2
Stiff argillaceous land	Best barley land	38	60		2
Stiff argillaceous land	Good barley land	33	65		2
Sandy clay	" " "	28	70		2
" "	Oat land	23 5	75		1.5
Clayey sand	" "	18.5	80		1.5
" "	Rye land	14	85		1
Sandy soil	" "	9	90		1
" "	" "	4	95		0.75
" "	" "	2	97.5		0.5

Binders now made, and the easiest on the horses are the

The foregoing table shows that the best wheat soils contain a large per cent of clay. It also shows that a heavy stiff clay, containing a considerable amount of humus, say six to twelve per cent, rendering it open and porous, may be classed as among the best wheat lands, while the same amount of humus (decaying vegetable matter) would render a more open soil too light and fluffy. Hence stiff clays, containing but little humus, may be rendered available for wheat, by manuring with rotten straw or other litter, always in connection with draining if the soil is naturally wet. Argillaceous and marly soils are clayey, and the same may be said of strong loams. It is proper to note here that it is advisable in purchasing a self-binder to be careful to get one that is light in weight and draft, like the Deering, as otherwise, if the harvest is at all wet and the ground soft or waxey, it will be impossible to prevent the binder from miring down and failing to work.

IV. PREPARATION OF THE SOIL.

Summer-fallowing has long been considered as among the best means of giving favorable conditions for a crop of winter wheat. It has the three-fold advantage of resting the land, freeing it of weeds and insect life, and of thoroughly disintegrating and altering the mechanical texture of the soil. But it is expensive, and not really necessary on rich Western farms, where Indian corn forms an important portion of the early crops. But on soil where Indian corn or some equivalent is not grown, summer-fallowing becomes necessary.

V. A CORN FALLOW.

A crop of corn, on land well plowed and thoroughly cultivated, forms one of the best preparations for wheat. It is clean, has a good surface tilth, is firm, and yet well disintegrated as to its lower portions. The stalks standing after the ears are husked form considerable winter protection, and hence wheat sown between the rows early in autumn and carefully covered with the double shovel plow or cultivator, or better—drilled with machines made for the purpose—usually gives good crops. The standing stalks cut down in the spring give little trouble to the working of any of the *Deering Twine Binders.*

VI. PLOWING FOR WHEAT.

In plowing for wheat, the farmer must be guided by common sense, as in any other work of the farm. The surface soil is that intended by nature for feeding the roots of the cereal grains. All the small cereal grains require a rather firm soil, wheat and rye more so than the others, oats and barley to a less degree, and flax less than the latter two. Deep plowing is admissible for wheat, in a degree as it would be for other crops, through some peculiarity of the soil. But for any crops it is ruinous to turn up the crude subsoil. If necessary, subsoiling may be practiced in connection with under-draining, the subsoil being merely loosened and left in the bottom of the furrow. But for wheat, if the soil must be loosened deeply, time enough should elapse before seeding, so that the soil may again settle evenly. Then a surface tilth may be worked and the seed sown. On average soils of the great wheat regions of the West, good plowing, at ordinary depth, is all that is required. If several plowings are to be given, the first pretty deep, the subsequent plowings should be shallow.

VII. DRAINING FOR WHEAT.

Wheat not only likes a firm soil as to its depths, but it must also be a dry soil. That is, a soil that will not become saturated with water, and remain so twenty-four hours after a heavy rain. If so, it should be drained. How to do this, every farmer must decide for himself. Often the draining of a very small portion of a field will render the whole fairly alike in respect to the time when it may be plowed. When the price of a crop will warrant the immediate outlay, under-draining will be the cheapest in the end, but much may be done temporarily by plowing deep furrows in these parts of the field, that remain saturated, these leading to points where the water may have free passage. If the land is so level that water will not pass away quickly, plowing in regular lands, say two rods across, with deep and well cleaned out dead furrows, will generally effect fair drainage, in connection with furrows leading to the dead furrows, from such portions where water collects and stands. It is worth while to note that such is the simplicity and strength of the

Deering binders that as they successfully hold out against the rough usage and severe test of the irrigating ditches of Old Mexico and Colorado, so there is no obstruction to their successful working on the lands drained as described above. Recollect, it is worse than useless to attempt to raise any dry land crops when water stands during the season of growth for twenty hours at a time. It will certainly change the color, and of course injure the vitality of wheat.

VIII. BROAD-CAST SEEDING *vs.* DRILLING.

There is little to be said under this head. There is no doubt of the advantage of drilling over the broad-cast seeding of grain. Let some well determined facts suffice: In drilling, about one-fifth of the seed is saved, often one-fourth; that is, where one and a half bushels are used broad-cast, something over a bushel, often less, will give as good returns drilled. The reason is that in broad-casting, much seed is left uncovered to be picked up by birds. From being unevenly covered it comes up unevenly. In drilling, the seed is surely placed in moist earth, and as certainly comes in contact therewith. It lies in mellow soil and will not be covered with clods. The drills gradually accumulate soil from the sides, so that instead of the soil being blown away from the wheat, as in broad-cast seeding, it is gradually drawn about the young plant. In broad-cast seeding, if the surface becomes dry, the soil is often blown away from the necks of the plants. In drill rows, if the ground becomes crusted, the rows being straight, the crust is easily broken without injury to the plants by a slanting harrow toothed implement that any farmer may improvise, the teeth to slant back at a very slight angle. In drilling there are no weak spots in the field due to slack seeding, and the seeding may be graduated to the exact requirements of the soil. While making these statements in favor of drilling seed, we wish to have it understood that it makes no difference to the Deering binders whether the wheat to be cut is growing evenly on the field or not, as the sheaves made by the Deering are all of the same size, even if the stand is thin in one place and thick in another. In harrowing-in wheat, it is never covered deeply enough,

namely, one and a half inches for heavy clays, and two and a half inches for light sandy soils. Two inches is the proper depth for ordinary loams.

IX. PROPER DEPTH OF SEEDING.

It is difficult to make persons, who have given the matter little attention, believe there is much difference in results between seed just covered and that covered four inches deep with the plow. Yet improper as is either of these extreme depths of covering, the advantage, winter wheat being in question except on soil inclined to be wet, is rather in favor of the deeper than the shallower of the two extreme depths of covering. For at four inches deep the wheat is generally covered with the plow, and thus while none of it is more than four inches deep, much of it is much less. Such careful experiments have been made in this respect that there is no doubt as to the proper depth of covering wheat. The table annexed is correct and conclusive as to germination:

Depth Sown.	Days Coming Up.	Proportion Growing.
½ inch	11 days	⅞
1 inch	12 days	All.
2 inch	18 days	⅞
3 inch	20 days	¾
4 inch	21 days	½
5 inch	22 days	⅜
6 inch	23 days	⅛

The object in sowing winter wheat rather deep is protection against frost. In practice, it is found that one inch for spring wheat and two inches for winter wheat is the proper depth. The reason for the greater depth in the case of winter wheat is the danger from exposure of the roots by the surface being blown away in dry winters, with strong winds. There is a tendency in all soils to heave more or less near the surface, therefore, in deeper sowing there is less chance of breaking off the fibre roots by the process of heaving. It has been found in broadcast seeding that the grains sown shallow were the first to suffer from the effects of severe winters. At the proper depth of two inches in the case of winter wheat (or one inch in case of spring wheat), as shown in the cut Fig. 1, the true roots are thrown out immediately about the grain, and the leaf stalk rises healthy, and the leaves are strong. In Fig. 2 is a correct

Fig. 2. Sown 6 inches deep.

Fig. 3. Healthy Wheat Plant.

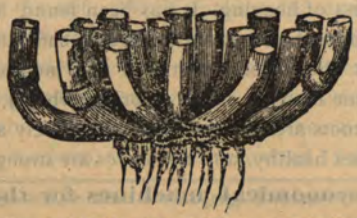

Fig. 4. Healthy Wheat Plant at maturity. Cut above first joint.

Fig. 1. Sown 2 inches deep.

representation of a grain of wheat sown six inches deep. The leaf stock becomes almost exhausted before it reaches the surface, and just below the surface a nodule, marked *a* in Fig. 2, is formed from which the true roots must spring. *B* is the plumule, from which spring the leaves. When the true roots are formed at *a* the weak roots at the seed-kernel die. In Fig. 1, the primary roots continue to increase. At *a a* is shown germs of true additional shoots to form tillers. Eventually the roots will fill the ground, and the full tillered, strong, healthy, young plant will present the appearance shown at Figure 3. When mature, the healthy plant cut above the first joint will show as at Fig. 4. Now the shallow sown (one to two inches deep), as compared with the deep sown (six inches), the deeper will always be the weaker, and during its whole growth more likely to suffer from insects, fungus, atmospheric contingencies, and the various diseases to which the wheat plant is subject.

X. TEMPERATURE, GROWTH AND RIPENING.

Fertility of the soil, with proper temperature and moisture with prudent management, is all that is necessary to produce wheat in perfection, and a Deering binder having been provided with which to gather it, the chief problems in the raising of wheat have been solved. It has been found that the lowest temperature at which wheat will germinate is 41 degrees Fahrenheit, the highest 104 degrees, and the temperature at which germination is most rapid is 84 degrees. But, the temperature of most rapid germination is not the best for the growth of wheat. The most favorable temperature probably lies between the lowest and most rapid. This would give 62 degrees as the most favorable for wheat. But it is well known that although spring wheat sown very early will lie in the ground intact, and come up but little earlier than that later sown, yet the earlier sown always gives a better crop than late sown wheat, and for this reason, we conclude, that the slow growth of early spring is most favorable for healthy development. A safe conclusion to draw in regard to any crop is that a certain aggregate of heat is necessary to mature the crop. Accordingly, it has been found that wheat,

when the average temperature during the period of growth was 56 degrees, required 160 days to come to maturity. With the average temperature of 59 degrees, 137 days were required; at 76 degrees only 92 days. Now the total of heat for each of these periods would be, in the first case 8960 degrees, in the second 8083, and in the last case 6992 degrees. We also know in practice that the climate that ripens spring wheat in about four months from sowing gives the best average crop. Experiments show another thing, viz.: that wheat may be ripened where there is a high summer heat for three months, as is the case in some high northern latitudes.

XI. SEED, SEEDING AND HARVEST TIME.

The proper time of seeding any grain is learned by experience. To many experienced farmers the table below may not be valuable except as a study, but prepared as it has been from extensive correspondence among a vast number of farmers in many states, it will serve as a correct guide to all that large class not thoroughly posted in wheat raising.

The time of seeding for Minnesota will correspond with that of New Hampshire, for the southern part, and to that of Maine for the northern portion. The range for Dakota will be that of Iowa for the southern portion, and that of Maine for the northern half. When spring is the season mentioned, spring wheat is indicated, and autumn sowing has reference to winter wheat.

XII. CLEANING THE CROP.

When attention is given to properly cleaning the seed, and it is sown on clean soil, no weeding will be necessary. Where the crop is sown broad-cast, little can be done except cutting the weeds just at the time the wheat commences shooting up its stalk. In fact, in the West, the crop must, as a rule, take its chance with the weeds. It will, however, be wise economy to hand-pull all mustard, rape, cockle, or other vile stuff, since every seed that falls to the ground is sure to grow, and may remain indefinitely in the soil without some such careful means of eradication. There is no reason for weedy ground in this day of superior cultivating implements, and even if the weeds are allowed to grow with

STATES.	TIME OF SOWING.	AVERAGE SEED PER ACRE.	TIME OF HARVEST	BEST SOIL.
Maine	May 15 to June	1½ bush	August 20 to 30	Sward, corn stubble.
New Hampshire	April to May 20	1½ to 2 bush	August 1 to 20	Clay loam, new upland.
Massachusetts	April 10 to 25	1¼ to 2 bush	June 25 to Aug. 10	
Vermont	May 1 to Sept	2 to 2½ bush	Last Aug. to Sept. 1	Loam clay, clay loam.
New York	May 10 to Sept. 1	1¼ to 2 bush	July 2 to Aug. 10	Sandy loam, clay loam.
New Jersey	Sept. 1 to Oct. 15	1⅛ to 2 bush	June 28 to July 7	Friable loam, clay loam.
Pennsylvania	Sept. 1 to Oct. 15	1¼ to 2 bush	June 15 to July 15	Clay soil, sandy loam, limestone, clay, gravel.
Delaware		1⅛ to 2 bush		
Maryland	October	1½ bush	June	Rich loam, clay.
Virginia	Sept. 15 to Nov. 30	1 to 2 bush	June 15 to July 15	Clay, clay and lime.
South Carolina	Oct. and Nov	50 lbs	June 1	Clay.
Georgia	Sept. 15 to Nov	¾ to 1 bush	June 1	Red mulatto.
Alabama	Sept to Dec	½ to 2 bush	June to July	Loam, oak and hickory.
Tennessee	Oct. 12	1 to 1½ bush	June 15	Dark loam, all kinds.
Kentucky	Sept. and Oct	1¼ bush	July	Clay.
Ohio	Sept. 1 to Oct. 25	1 to 1½ bush	June 28 to July 20	Oak and maple, limestone, clay loam, sandy.
Indiana	Sept. to Oct	1 to 2 bush	June 15 to July 20	Sandy loam, clay loam.
Illinois	Aug. to Sept. 30	1 to 1½ bush	May to July 1	Sandy loam, clay, clover ley.
Michigan	Sept. 3 to Oct. 1	1¼ to 1½ bush	June to July 30	Marl clay, oak, clay loam.
Iowa	Aug. 20 to Sept. 15	1¼ to 1½ bush	July 5 to 20	
Texas	Oct. to Dec 15	¾ bush	May 1 to June 10	Lime soil.

the wheat, they are all gathered in by the Deering binder, which will enable the careful farmer, by the use of mills made for the purpose, to separate the foul seeds from the grain. The subject of cleaning will be treated of in another chapter.

CHAPTER III.

PARASITES AND DISEASES.

I. INSECT ENEMIES.

Persons who have not given the matter special attention do not realize the large number and distressing character of the enemies to which wheat is subject. Smut, rust, and mildew, are the general names applied to a class of fungus diseases occasioned by many parasitic plants. These are supposed to be the result of atmospheric conditions often in connection with the state or nature of the soil. In fact, the germs are always present and only await favorable atmospheric conditions—heat and moisture—to start into full life and activity. For instance, the spores of smut found in smutty grain are so minute that 7,500,000 can be placed side by side in the space of a square inch, and the spores of some funguses are so minute that under a powerful microscope they appear as fine dust. These spores correspond with the seed of flowering plants. Hence we see the reason why smut, rust, mildew, etc., are so prolific in hot, muggy weather. They have received the proper conditions for growth. Animal parasites may be a condition of disease, or they may be true devourers like the chinch bug, Hessian fly, army worm, etc.; insects produced in the regular order of nature, under a combination of favorable circumstances, often extending for years. Under favorable conditions the increase is so large as to cause the partial and often the general destruction of crops over wide areas. Unfortunately, when these general visitations occur, but little can really be done to exterminate the pests, until the general atmospheric conditions favoring their increase enable birds and insect enemies of these to assist in the work

bundles; they save all the grain; they save gathering, by

of extermination. Hence only the more common and the most successful means of combatting them will be given, beginning with the vegetable parasites.

II. RUST.

This is well-known, from its causing the leaf, and often the entire stalk to assume a red appearance. It stains any surface upon which it is rubbed. This has generally been relegated to a fungus, wonderfully multiplied under heat and moisture, botanically known as *puccinia graminis*. It generally follows severe rains, succeeded by showers and hot suns, and is most usual in soils containing largely of humus. It is especially found on new, rather fat soils, showing its origin to be soil conditions as much as atmospheric conditions. The disability generally grows less and less with the wearing of the soil, and especially so on thoroughly drained lands. It is said that seed steeped in mixtures for the prevention of black smut—to be given hereafter—have been found valuable, but this has not been fully demonstrated. Going over fields with a stretched rope between two men, to brush off the dew, or the moisture after rain, has been found useful; but it is impracticable on large fields. The best means of saving a field attacked with rust, the grain being in the dough state, or nearly so, is to cut and shock as quickly as possible. Thus the grain will often ripen and produce a fair crop, that if allowed to ripen on its roots would prove worthless. As a perfect means to this end, the DEERING BINDERS are to be recommended, on account of their speed, certainty of action and clean work. For the wheat grower to be without such a machine as the Deering is to put himself at the mercy of rust and other like enemies of his wheat crop. He can not afford to do it.

III. SMUT.

This seems to be a true sap parasite, changing the grain to a black dust, spores of uredo. There is no doubt that smut is taken up with the sap of the plant, and that it influences the whole growth of the grain. Growing wheat, affected with smut, does not attain its natural size, and the leaves exhibit a deep unhealthy green from the blackened sap

within. The ripened spores or reproductive germs, where wheat infested with rust is threshed, are, under the microscope, seen in masses adhering to all the grain. There is no doubt but smut may be prevented by washes followed by liming, since this means is known to destroy the vitality of the spores.

Soaking the seed grains in a rather strong solution of copperas for six or eight hours and then drying by rolling the drained seeds in air slacked, or better, pulverized quick lime, will destroy smut. So, also, will soaking in brine that will bear up an egg. Skim thoroughly after soaking eight hours, then drain and roll in lime before sowing.

IV. MILDEW.

This fungus is largely developed by heat and moisture, its effects being caused by much the same conditions as that of rust. It is rare on any of the cereals except wheat, but common on the grasses. It is undoubtedly a sap-feeding parasite like rust. Wheat very thick on the ground or lodged in hot showery weather, or in hot, damp, close weather develops mildew rapidly. Peculiar soils and soil conditions, especially new lands develop fungus growth most rapidly. The general prevention is thorough surface or under-draining. Grain cut immediately will often ripen a fairly plump berry. Here again the invaluable aid given by the Deering binder comes in. It is certainly painful to think of a field of handsome wheat, so many waving acres, as it were, of good dollars rapidly spoiling and losing its value, while the owner stands by nearly helpless because he has no efficient binder with which to gather it rapidly into shock.

V. INSECT PESTS AND PARASITES.

The hateful grasshopper of the trans-Mississippi region is one of the most serious pests that has yet affected crops there, but all others will in the course of time probably appear. In fact, many have already done so in all except comparatively new districts. The grasshopper is too well known to need description. Fortunately their ravages of late years have been so infrequent as to lead to a belief that the settling up of the Rocky Mountain regions will eventually cause almost their entire

disappearance. Driving them into fires, or into ditches and crushing them, or covering with straw and burning, is one of the means of destruction. Trapping them by means of hinged machines drawn by horses is entirely practicable. The machine has a bag net or box trap attached, into which the insects are forced as they are gathered to the center of the machine. On those plants, the leaves or fruit of which are not food for men or animals, the 'hoppers may be destroyed by solutions of London purple or Paris green, one pound of the poison to forty or fifty gallons of slightly sweetened water.

VI. THE ARMY WORM.

This is fortunately an insect that appears only once in a number of years. When found approaching a field, ditches flat in the bottom should be made into which the worms will congregate, when they may be killed by passing a roller, made to fit the ditch, constantly back and forth. Once in a field, of course they may be poisoned with a solution of Paris green sprayed over the field. It is too dangerous to animals, however, to permit its application either to pastures, meadows or grain fields. There are several species of measuring worms called army worm. The grass army worm is one that infests cereal grains also. It is the larva of an owlet moth named *leucania unipuncta.* The eggs are laid generally in old grass and grain stubble, and the burning of all old fog in grain stubble would naturally prevent their appearance in destructive numbers.

VII. THE HESSIAN FLY.

The Hessian fly, as its name imparts, is an introduced species, coming to us during the Revolutionary War in the straw and hay of the Hessian soldiers, hired by the British government during our struggle for independence. The name of the fly is *cecidomya destructor.* It lays its eggs in the young wheat, and, hatched, the larva sucks the juice of the plant. Cold will not kill them, and it is hardly likely Paris green will, since they do not necessarily imbibe it. Late sowing in infested districts seems to be the only practical remedy, though plowing the stubble just before sowing is also one of the remedies. For-

tunately the fly only infests wheat in exceptional seasons, and numerous parasites attack both the fly, the eggs and maggots.

VIII. THE CHINCH BUG.

Chinch bugs are really one of the enemies most to be dreaded where they find a lodgment. It happens fortunately that for them to find lodgment extensively, seasons must be favorable, though the extreme cold of winter does not affect insect or eggs. A wet season is especially fatal to them, sometimes causing their disappearance in a surprisingly short time.

The full grown winged insect is little more than an eighth of an inch long, and may readily be known by its disagreeable smell when crushed. The first brood is laid in June. Hungarian grass is said to be preferred by them. Hence it has been advised to sow seed of this grass, and when fairly infested plow the whole under, and roll down hard. Flooding a field will kill the insects, and strong healthy grain, from its abundant succulence, is not thought to be favorable to either the hatching of the eggs or the insects. There is really no effective means of combatting the insects once they are fairly established. After harvest they congregate in the corn. The insects winter in the stalks and especially in old stubble, dry grass and rubbish; hence, burning all stubble, dead grass, and stalk fields is the most economic way of killing them. Thick sown wheat is not favorable to the development of the insect. Hence, the natural precaution against the increase of this pest, where known, will be seen to be general clean cultivation of crops, flooding when practicable, and especially the burning of all trash where the insects are known to be likely to occur. The chinch bug is a dry weather insect, and hence threatening to western fields in dry seasons. Thus clean cultivation, plowing up of stubble and burning of all winter trash is the most intelligent system of combatting the plague when found. In this connection, let it be remembered that if the grain is attacked by any of the pests mentioned above and it is desired to cut the grain quickly, the Deering Twine Binders are the most reliable for prompt work, and will not get out of order when so much depends upon good work.

CHAPTER IV.

THE HARVESTING OF WHEAT.

I. GETTING READY FOR HARVEST.

The farmer who neglects to see that all implements or machines are fully ready for work, before the time such implements will be required, fails in the first essential to good farming. It is especially necessary in harvesting, not only that the machines are found in perfect condition, in all their details, with no loose working parts, the rubbing surfaces bright and well oiled, cutting edges sharp, no lost motion in gearing, but also that the machine or implement is the very best of its kind. A good machine in comparison with an inferior one will pay twenty per cent on the difference in investment yearly, and the working use of the superior machine will be fully double that of the inferior one, all other things being equal. While the inferior machine may do fair work when it does work kindly, the stoppages, breakage, slobbering of grain and tearing of straw, will make a waste that no man will stand *once he studies the points between machines. Hence it is taken for* granted that every farmer whose eyes these pages meet, will investigate for himself, to determine the absolute superiority of the DEERING TWINE BINDERS. The sale will then be only a matter of detail.

II. ATTENTION TO WORKING PARTS.

The manufacturer, when he has delivered a machine according to contract, correct in all its details, has fully performed his part. The responsibility of the buyer is no less important. The first thing that he must make himself acquainted with is the several working parts, especially the bearings, cutting surfaces, elevators and binding apparatus. None but the best lubricators should be used, and here only enough to prevent undue heating and wear. If the machine is expected to wear year after year, as it should, it must be carefully housed when not in the field; and it is wise economy to protect from rain and sun in the field when not at work. While it is true that a perfect machine will last far longer than

lent points in favor of the Deering Twine Binders might be

an inferior one when exposed to the weather, it is wise economy to protect in the best possible manner, for thus perfect work continues to be accomplished year after year. The standard of excellence, proven year after year, is the DEERING TWINE BINDER.

III. THE TIME TO CUT WHEAT.

Since the introduction of the Deering binders, the ability of the farmer to exercise his choice and follow his opinion in this matter has been very greatly increased.

Formerly, when it was necessary to summon in all the help that was to be obtained and the machine relied upon was cumbersome, of small capacity and liable to get out of order, it was often necessary, in order to save all the grain, to get to work before it was really advisable and to harvest some of the wheat, if it was not lost by overripeness or storms, later than was desired. But all this is changed by the Deering binders. Any farmer owning one of these machines has only to say to himself "My Deering will cut fifteen acres per day (from fifteen to twenty-five acres, depending on the width of cut and the hours of work), and as it never gets out of order, I have only to divide this into the number of acres I have to cut to get the number of days required, and this period I can place at any time in the harvest season I wish," and so he can thereby harvest his wheat in whatever condition experience may have taught him to be most advantageous. The points in binding grain properly are then the following:

1. GOOD EVEN TENSION AND TIGHT, CERTAIN BINDING. As many of the self-binders made still continue to use the old fashioned knotters, we feel obliged to state that the Deering binder, with its simplified knotter and perfect tension, is probably the only binder that will perfectly meet these requirements.

2. EQUAL SIZED SHEAVES AND EVEN BUTTS. The Deering twine binder introduced among grain binders the principle of automatically sizing the bundle, and has, so far as we know, the most perfect devices to accomplish this end.

The time to commence harvesting must depend somewhat on

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so extended that these pages would not contain them, but

the amount of grain to the machine, and facilities for getting help. Where all these are ample, there is no possible doubt but that wheat cut while yet the grain may with some difficulty be crushed between the fingers will give the greatest yield of flour. If millers would give more for such grain it would be economy to cut as much as possible when in what is called the soft dough state. But they do not so discriminate. In fact they can not now do so, since wheat from many fields may go into the same elevator. Hence the best time to cut wheat is when it is in that state that it can not easily be be crushed between the fingers, for at this time the yield will be larger, and the quality better than at any other time. Hence each farmer must decide for himself, as between the period earlier than this, that will enable him to secure the largest amount in the best state for market. Difficulty in curing of earlier cut grain, and danger of crinkling down later, must also be taken into consideration. During hot, dry weather, the change from the milk state to that of perfect ripeness is rapid. In cool weather this period may extend to twenty days; very hot weather may limit this period to ten days. The best condition for cutting can not always be told by the color of the straw. Some varieties approach the golden color and yet are not quite fit for the harvest. But if yellowed by rust, lose no time in getting it down. Cutting enables what sap there is in the straw to ascend to the grain The sap is deterred from doing this when standing on its own roots. The time when wheat is in the best state to harvest must be decided, as before stated, by each one for himself. The general indications for ripeness in healthy wheat are when the straw shows a bright, golden yellow color from the bottom of the straw nearly to the ear, and also when the ear begins to bend decidedly with its weight. If the greener heads of a field rubbed in the hand will separate from the chaff, then the crop is ready for the harvester. The color of the straw, however, is the best test. When yellow, it no longer draws sap from the soil, and will ripen heavier cut than uncut. This test is applicable also to barley and oats. Rye straw is paler when ripe than the other grains mentioned.

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we can not omit mentioning that they have the simplest

IV. ABOUT BINDING.

The most objectionable things in the harvesting of grain are slack and unequal tension in binding, and unequal size of bundles. It may add essentially to the cost of handling the crops, a most important consideration. Besides this, uneven or loose binding constitutes an increasingly great nuisance from the shock to the threshing machine. The machine that maintains the most even tension in binding, other things being equal, is worth the most money by long odds. Why? In stacking, compactness is the essence of safety from rain. Loose bundles cause loss of most valuable time in loading on the wagon, and uneven, loosely bound bundles never form a decent stack. If to this is added the extra trouble in handling unbound or slip-shod sheaves in threshing, perfect work will be appreciated. A self-binder that makes a slovenly misshapen bundle should not be tolerated in the field. The shape of a bundle is largely due to the working of the reel. The reel on the Deering twine-binder is especially adapted to all kinds and conditions of grain. It has a remarkably wide scope of adjustment, being capable of occupying sixty-five distinct positions, enabling it to be placed higher up, lower down, further forward and further back than any other reel. With such a reel the operator can lay the cut grain upon the platform of his machine in perfect shape for binding. We mention the reel on the Deering Binders in particular on account of the fact that it is radically different in principle from those on other machines which do not apparently coincide with the Deering factory in its belief that the capability of being adjusted to many various positions is essential to a good bundle. This being done, it only remains for the binder to keep the grain in perfect order until it is bound. For

Sheaf as bound by the DEERING TWINE BINDERS.

this work, the Deering Twine Binders are provided with a device called the Canvas Adjuster and Butt Board. The revolving canvas makes the butts of the grain even, and the Butt Board keeps the bundle square until it is bound. The result is a bundle with square butt, as shown on the previous page. Without the Butt Board a bundle with ragged butt is made. It will be valuable information to anyone not thoroughly familiar with the various self-binders, to know that some of the various machines made and sold have no adjuster whatever, and that none except the Deering have the Adjuster and Extension or Butt Board, as it is controlled by patent.

V. BINDING TWINE.

This is a subject on which many of our readers have learned much by bitter experience, and to those who have had this experience we have not much to say, because they already know just what we are about to say to those who have had less experience.

A wheat crop can not be properly harvested without good binding twine, no matter how perfect the self-binder may be. In the manufacture of twine it is possible to make a poor and nearly worthless article so that it will appear to be very much the same thing as the honest, well spun and tested article. There are, unfortunately, people who are willing to take advantage of this fact, and we have known of very many instances where irresponsible dealers, and even irresponsible peddlers (calling themselves agents for dealers), have sold for good twine that which proved to be good for little or nothing. On account of the difficulty or impossibility of knowing good from bad twine before using, it is proper to have behind the twine the guaranty of some large and responsible house like that of William Deering & Co.; to this responsibility is added the vital fact that William Deering & Co. are interested in furnishing only the best twine, because without good twine not even the best twine binder can do efficient work and retain its good reputation. If the binding twine furnished by them through their authorized agents is used it may cost a trifle more than an inferior twine in money per pound, but it will be cheaper per foot and worth much more in saving annoyance and delay

VI. SHOCKING WHEAT.

It has been truly said that the measure of good shocking is in proportion to "catching weather" generally experienced in the harvest time of a locality. The rule in the West is fair weather in harvest, but few harvests ever pass without rain. Indifferent or slovenly shocking will often reduce the price several cents per bushel, while it really takes no more time to shock well than badly. It is simply a question of deftness and attention. With sheaves from the DEERING BINDER, for the reason that the bundles are even in size and firmly bound, any strong boy may soon be taught to shock perfectly; and the man who can not, or will not do so, after being shown how, should be immediately discharged.

The Deering Harvester with Bundle Carrier, as shown on last page of cover, is a great assistance in shocking, and saves the wages of a boy in gathering the sheaves into shock rows, besides saving the handling of the sheaves once. In gathering sheaves by hand they are dragged over the ground and dropped into piles entailing the loss of considerable grain by shattering. The Deering Bundle Carrier saves one handling, dumps into the shock-row four or five bundles according to the size of shock desired, making a half shock at each dump, and completing the shock on the next round. It dumps its load gently, does not shatter the grain, and lays the sheaves in a neat pile ready for the shocker. The Carrier is easily managed by the foot of the operator. It folds up out of the way in passing through a gate, and is not in the way while threading the needle, or oiling the binder parts. It is the most perfect Bundle Carrier ever put on a self-binder. This feature of the Deering binder alone is of sufficient importance to determine a farmer in his choice of a binder.

VII. FORMING THE SHOCK.

There are three principal forms of shocks. The long ten-sheaf double-capped shock; the long twelve sheaf double capped shock, and the round single capped shock of ten sheaves. The twelve-sheaf shock is made by setting six sheaves firmly side by side in a line, with a sheaf somewhat leaning at each end, and one on each side at the middle. Or,

set four sheaves in a row by striking the butts firmly into the stubble, the end sheaves standing towards the two first set. Against these place three sheaves firmly against each side, slanting somewhat, but all firmly thrust into the stubble, and always so the length of the shock will point east and west, where the prevailing winds are in these directions, since thus they are better saved from storms. This ooo / oooo / ooo will, before being capped, present the appearance of the diagram. The eight-sheaf shock is made by omitting the two end sheaves. There is a loss of two sheaves in every capped shock and without any gain. A ten-sheaf double-capped shock is shown in the cut. It will be seen that a sheaf may be placed firmly at each end, and be fully as safe from wet as the rest of the shock. A round shock is made by setting a sheaf firmly in the stubble, and placing around ooo / ooo / ooo it eight others, as in the diagram. The outer ones inclining so that when pressed together for capping the whole will stand firm, especially if the bundles are square butted, as is always the case if they are bound by one of the Deering twine binders. Practically it is accomplished by setting three sheaves in a row with two others, one on each side of the center sheaf, and filling the gaps, making nine sheaves in all. After pressing the whole firmly together a sheaf is prepared, as shown in the cut, the inverted heads hanging down over the sides. Round shocks stand wind from any direction. Long, double-capped shocks, should present the narrow sides to and against the direction of the prevailing winds.

Ten-Sheaf Double-Capped Shock.

Round Shock of ten Sheaves.

VIII. CAPPING THE SHOCK.

In all shocks requiring double caps, and in machine binding, the

and lowering device ever used on a Twine Binder. Farm-

long ten-sheaf foundation is best. Take a sheaf and break all the heads towards the band, equally on each side, and lay it on the shock, the butt to the end, spreading the heads well and the butt somewhat. The second cap sheaf is broken down at the band, all one way, but somewhat spreading and placed so the butt will point to the direction of the prevailing wind, and so the tops will finally cover the first cap beyond the band. The whole will present somewhat the appearance of the ten-sheaf shock, shown on page 35, but will contain twelve sheaves, including the two cap sheaves. The manner of breaking down the cap sheaves is shown below.

Upper Cap. First Cap.
Cap Sheaves broken open for covering the Shock.

IX. STACKING.

The building of a stack, perfect in every respect, is a fine art, that but, very few persons seem capable of. Building a grain stack that will settle comparatively even shaped, like an egg resting upon its broader point, and that will shed water perfectly, and not have to be braced to keep it from falling over—even this is not learned without practice and careful study of all the details. Of course much depends upon the perfecton of the binding. Stacking is made comparatively easy with bundles bound by the Deering twine binders. Every sheaf must incline to the outside of the stack. The sheaves must be evenly laid out up to the bulge of the stack, thence carried up square for about three sheaves high, and then gradually be drawn in to a sharp peak. This is undoubtedly the best form

of stack for the West, where thatching is not practiced; nor is thatching necessary if the stack is carefully laid, and the pitching is done from different sides successively, to prevent settling unevenly. It is true a square stack will require less thatch than a round stack, but thatching is not practised here, and a perfect square stack is more difficult to build than a round one.

X. HOW TO BUILD THE STACK.

It is always better that the stack have a timber bottom, if possible, and this should be considerably higher at the center than at the sides. One man is all that is allowable on the stack, to whom the pitcher throws the sheaves. A deft man will catch nearly every one if the pitcher attends to his business. In the case of a large stack an assistant may be allowed, and also this is sometimes necessary when the stack gets well up to the finish. To commence, set the first sheaves upright, commencing at the center, and continue to place sheaves closely against and around the first sheaves, until the outside circumference is reached. The inclination will gradually become less and less. The outside course is then carried around in a perfect circle, and in a more sloping manner than that of the other sheaves. This will leave the center of the stack well raised up, and this condition must be maintained throughout the whole building of the stack. The bottom of the stack being finished, proceed to lay courses regularly from the outside, in, until the middle is reached, one course a little within the last, so as to preserve the raised shape constantly to the center of the stack. Each successive outside course of Deering-bound sheaves is placed a little further out than the preceding outside course, so that the stack will hold its perfect egg shape until the full outside width is reached. Care must be taken that each sheaf is laid close to its neighbors, and the butt of each sheaf should be stricken lightly into the one beneath; this prevents the slipping of sheaves. Then one row of sheaves may be placed a little further out than any of the others, preparatory to drawing in, but the writer has never had any difficulty in saving grain by laying three layers of outside courses flush, and then commencing very gradually to draw in.

The Stack as carried up from the ground.

In drawing in, be careful not to allow the center of the stack to lose its full crowning appearance. Remember that the center of the stack receives the greatest pressure and always settles most. Hence this crown should be sufficient to allow for settling and still have every sheaf head decidedly higher than the butt. The above illustration shows the stack finished nearly to the extreme width.

XI. FORMING THE TOP.

The top of the stack is formed by laying each successive outside

course of sheaves a little within the preceding one, yet not so much but that the stack will show a smooth appearance when finished. Keep the center well up and solid until the stack is drawn up to a sharp conical peak. The butts of the sheaves must be placed firm to avoid all danger of slipping. The eye of the stacker must be true and his judgment correct. It takes somewhat longer to do the work well than in an indifferent manner, but the result is, the crop is safe from being wet and the grain uninjured. One thing to be recollected is, the faster you draw in a stack the higher must the center be kept proportionately. Do not be deceived as to the saving of time in drawing in a stack fast. It is only allowable in case of a sudden storm of rain coming on. When the stack has been drawn to as sharp a point as possible, thrust a smooth,

The Stack Finished.

slender, sharpened stake down into the stack so only about ten inches of the top will show. Then form a large bundle of flail-threshed rye straw, or very long slough hay; place this evenly around the stake, the heads drawn so as to overlap around the crown as much as possible. Tie rather loosely about the crown of the stack, and as tightly as possible

near the end of the bundle along the stake. The stack is now finished until it thoroughly settles, when the peak may possibly require attention. A deft stacker requires no stake. The straw is deftly spread around the peak, tied at the top, held from being blown away by hay ropes crossed over the top, and the whole settles evenly and permanently. If well built, the stack will have the appearance as shown on page 39. The beauty and symmetry of a complete stack depends very greatly upon the regularity and perfect shape of the Deering bundles. It makes little difference how skillful a stacker may be; if the bundles are slovenly bound, loose, and uneven in butt, the stack will be almost if not quite a failure, and much risk will be run of spoiling the grain before threshing time comes.

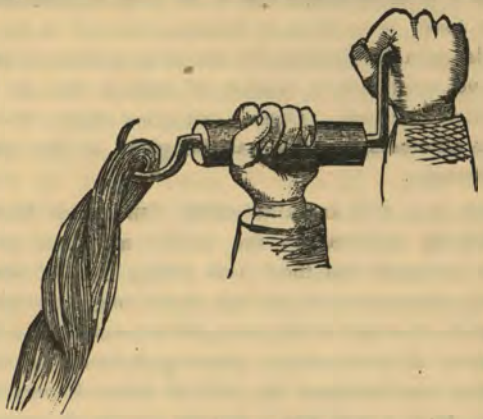
XII. RAKING DOWN.

The importance of raking down the stack on all sides until all loose straw is drawn out, thus giving the stack a neat appearance, is not generally observed. It will save any possible danger of water getting in, by insuring a full pointing out of every straw. A mere superficial raking will not suffice.

XIII. TWISTING BINDING ROPES.

A very simple implement is shown in this section for twisting ropes rapidly for binding down stacks of any description. They are held secure by being weighted at the bottom. These ropes are also a saving of labor, prepared beforehand, in binding corn shocks. To make these bands, throw down a quantity of hay or straw on the barn floor, sprinkle the whole and turn it over until the pile is moistened equally. It is better to lie moist over night if possible. Two persons, one a boy, are necessary to make the bands. A lock of straw is passed over the hook of the machine as shown, and connecting with the straw of the heap. The man commences turning the crank, walking backwards; as necessary, while the assistant continues to feed the material to form an equal and continuous rope. It is proper here to say that if the grain has been cut and bound with a DEERING TWINE BINDER that less raking of the stack will be necessary than when the grain is badly

bound, and there will be no necessity of weighting the stack to prevent its being blown over. The hay ropes will simply be required for the peak of the stack. Why? The butts of the sheaves will be square, the



Implement for Twisting Straw Rope.

sheaves even in size, there will be no loosening in the slipping of the bands. Herein lies the economy. There is clean work, requiring no gleaning. The binding is perfect, hence there is no loss of grain either in the field or stack.

CHAPTER V.

INCREASING THE WHEAT YIELD.

I. THE MAN WHO INCREASES THE YIELD.

This man will be the active, wide-awake, intelligent farmer who reads the papers and knows how to select the wise from the foolish in what he reads, the man who takes the trouble to know what method of work and what machine is best, and why it is the best.

This man will have the best tools and implements that are made

ers, for they are so simple that a child can understand

and sold, and when it comes to a self-binder he will, in the first place, be sure to have one, and *we think* he will be pretty sure to have a Deering, and it is to be feared that if, by some accident like his being misled by a lower price than a Deering can sell at, he has bought another binder than the Deering, he will be very likely to be sorry for it.

We have mentioned a number of reasons why we consider the Deering binders the best. There is one great reason which embraces and includes all others, and this can be given in the words of many thousands farmers:

"AFTER ALL, THE DEERING GIVES THE LEAST TROUBLE."

The Deering binders are the easiest machines on the horses. They are so balanced that there is no pulling back of one side of the machine, and consequently no pulling of the tongue on the neck of the horses. Again, the weight and gearing of the machine is at the rear, and there is no strain of heavy weight pressing down on the horses' necks.

The man who increases the yield of wheat is very likely, in fact pretty certain, to be a man who is entirely capable of seeing and appreciating a point like this.

He is pretty sure also to be able to see whether a self-binder is capable of being adjusted in every possible way that can aid its efficiency in the field. It must raise and lower easily and handily. It must tilt quickly and without exertion. The binder must be capable of shifting speedily and without a process like winding up a clock.

This man has used a good deal of good farm machinery, and he is considerable of a mechanic. He is perfectly capable of judging of the probable strength and durability of a machine, and he has not failed to notice the robust strength and grace of the Deering binders.

In short, the man who increases the yield of wheat, for many reasons that have been given and for many more that there is no space to give, has seen very clearly that he can not afford to TAKE CHANCES with his wheat crop, and proposes to cut it with a Deering binder.

II. SEED WHEAT.

The importance of sowing the very soundest, largest, carefully

them. One of the most valuable features of the Deering

ripened, thoroughly dried and heaviest wheat can not be over-estimated. The growth is not only made vigorous and even, but this vigor if it do not carry it out of the way of insect enemies and diseases, does prevent so serious injury as would otherwise occur. By careful selection, once the farmer has varieties satisfactory in his locality, the product may be improved, thus obviating the necessity of constant change of seed at high prices. The principal reason why change of seed is necessary is that too many farmers, once they have obtained a valuable variety, neglect to use the simple means by which the variety was obtained. This is selection and careful cultivation. It will pay any farmer to set apart a sufficient quantity of land yearly upon which no labor is spared to produce sufficient seed grown from the most careful selection of the previous year's seed. If enough were thus saved for seeding the general crop, reserving for the seed crop enough of the choicest for the seed field, the samples would improve from year to year rather than deteriorate, and the necessity of change would seldom arise.

III. CLEANING MARKET WHEAT.

Every large farmer should own one of the best mills that can possibly be made for sorting and cleaning grain. Certainly every neighborhood should own such a mill. The best farmers do not sell grain just as it comes from the thresher. The hurry and drive of threshing seldom allows perfect attention to the cleaning of grain, especially wheat. All the dirt and foul seeds must be taken from it before it goes into the grinding mill. All the trash left in the grain is at the expense of the seller. The buyer never pays for this. He pays simply the price of clean wheat, less the expense of making it clean. All this refuse is valuable to the farmer as feed, and is so much gain, for he gets enough more for the clean wheat, in grade, to pay for the cleaning, but to make up the difference in weight as between the clean and unclean grain. This is beyond controversy, else the buyers and handlers would soon go into bankruptcy. The margin of profits is low enough among grain raisers. They may be increased by selling none but clean grain.

IV. CLEANING SEED WHEAT.

The time to save seed wheat is immediately after threshing. First, clean it carefully to bring the grade up to the full standard that the berry will bear. No seed should be saved from a grade lower than No. 1 wheat, if possible. The best farmers save two years' supply to provide for the contingency of a bad harvest. If the seed is not wanted, it will always sell for more than enough to pay the expense of cleaning and storing. Seed wheat is perfectly sure at two years old, if thoroughly dried and saved dry. The simplest way of saving seed, as originally stated by the writer for the *Chicago Tribune*, will cover the essential points, and are as follows:

"The absolute cleanliness and good quality of the seed wheat—and this will apply to all seed grains—must be certainly known. If you have no cheat, or other foul weeds in the soil, and the seed be perfectly clean, your crop will be so. If the seed grains are large of their variety, dense, and uniform in size, the plants will be uniformly vigorous, according to the capability and adaptation of the soil to the crop. It is the most unwise economy to sow indifferent, foul, or light seed. Mills are now constructed that will take every foul seed from any grain by a proper regulation of the wind and sieves and special machines are now made to prepare seed grains of every kind. But it is not enough that the seed has been cleaned in the mill. This simply gives clean seed. What is wanted for the best results, for land in prime condition, is grain of the greatest specific gravity. This may be obtained by placing the grain on the barn floor and shoveling it in successive casts across the floor. The heaviest grain will be carried the farthest. If this heavy grain is sown by itself, and seed saved in the same way for successive years, the result will be astonishing to those who have never considered the question of heredity—as true in vegetables as in animals. Not only will the yield be increased per acre, but the quality of the grain will be increased in the same ratio as the quantity. To the slovenly farmer, who grows his crops among weeds, or he who refuses to feed his soil when worn, this trouble in the selection of seed will not pay.

Such farmers never make any money from their crops. A precarious living is all they can expect. Such men never read. They buy a self-binder because it is cheap and twine because cheaper than they know it should be. Their sole animus seems to be to reduce the average product as low as possible. The better class of farmers, however, who spend labor to put their soil in the best possible condition, will find profit in this special care in selecting seed. They well know that the self-binding reaper will cover as many acres of wheat yielding thirty bushels per acre as if only fifteen were grown. These are the men who make money upon the average light yield. Unless the crop is destroyed by fungus growths, storms, or insects, their average is good in seasons when the sloven gets hardly enough to pay for harvesting."

As indicating the importance of clean seed the estimates of the botanist of the Ohio Agricultural Station, will be important as showing the seeds that may be expected from the following weeds, as found in that State. The computation shows that Shepherd's Purse contained per plant 37,500 seeds; Dandelion, 12,103; Wild Pepper Grass, 18,400; Corn Gromwell or Wheat-thief, 7,000; Common Thistle, 65,366; Camomile, 15,920; Butter-weed or Horse-weed, 8,587; Rag-weed, 4,366; Common Purslane, 388,800; Common Plantain, 43,290; Burdock, 38,086 seeds. In this connection, from the minute size of many of our common weed-seeds, it will be seen how easy it will be to thoroughly seed the soil in one season through grain and grass seeds not thoroughly cleaned. It is not necessary to go into an argument to show the profit of sowing absolutely plump, ripe, clean seed. It speaks for itself. Careful selection is no less necessary.

V. SELECTION IN THE FIELD.

To start right, selection should be made in the field. The variety being pure, select the very best heads from an area of best growth, respect being had to stiffness and other good qualities of straw, evenness of head, leaf surface, and size of grain. If it be winter wheat, drill this one foot apart in rows, by ten inches in the row, in September. Hoe once before winter sets in, and when frozen cover it slightly with slough or

other clean hay, to prevent freezing out. Keep it clean by hoeing until it covers the ground. When ripe, select again the best heads for further improvement, and drill the balance in regular machine rows to take its chances. Continue until you have enough to furnish your full complement for winter seeding. If Spring wheat is the crop to be improved, the plan of procedure is the same as for winter wheat, except that the seed must be sown in carefully prepared soil, as early in the spring as the ground can be worked without injury to the soil. The cultivation is the same as for winter wheat, and so will be the selection and preparation of the seed. If such a plan were generally followed it would raise the average crop fully five bushels per acre, or equal to the cost of getting the crop ready for the harvest. When it is remembered that the DEERING BINDERS will as easily reap and save a heavy as a light crop, and that Wm. Deering & Co. do not charge a cent more for them when they are to cut 30 bushels to the acre than when they are to cut 15, every farmer may figure for himself individual profits. The improvement by special selection may go on from year to year, and the main crop from these trial patches may go into the lot for seeding the larger seed patch. Once you have a full stock the best may be selected, cleaned in the manner heretofore described, and the second quality will be so much better than the average seed that it will be eagerly sought at high prices. This plan may seem onerous, but really your extra seed will not cost you very much more than ordinary wheat, and once the stock is secured, the profits from the sale of the surplus will always give you your own superior seed for nothing. *One thing, however, must be constantly kept in mind:* Do not seek to improve the quality until you have first fully demonstrated that the variety is fully adapted to your SOIL, LOCATION, AND CLIMATE.

VI. PEDIGREE WHEAT, AND A PEDIGREE HARVESTER.

The plan outlined in Section IV. will give you pedigree wheat to all intents and purposes. That is, wheat (and the rule will apply to

any grain) that will hold its characteristics perfectly, and impart its qualities to the succeeding crops, if in the meantime you do not become careless in the business. It is a well-known fact that superior stock requires excellent care and feeding to keep it up to the high standard to which it may have been brought. But it makes profit nevertheless. The same is true of any crop, a fact the better class of farmers well know. The success of Major Hallett, of England, in this respect is a matter of history, and the system has been extended to other grains, especially barley. This with cross fertilization embraces the measure of success of those who make the growing of new and select varieties of grain a regular business. The farmer must decide for himself whether it will pay him to enter this field. However this may be, that he can not afford to go on sowing such seed as he sells in the market, as grain, is patent. In fact few of them do, after seeing the DEERING TWINE BINDER march through a field of heavy, long headed grain, throwing off uniform, perfectly bound sheaves, with a click, click, click, upon the Carrier, which drops its complement of bundles, in regular order handy for shocking, by the mere action of the driver's foot. It is a well-known fact that the perfection of machinery, has made possible a better system of cultivation. Why not? The farmer no longer has to sweat swinging the old-fashioned cradle. He no longer breaks his back raking and binding by hand. With a perfect machine the harvest goes on regularly and perfectly. And perfect machinery naturally leads to an improved system in the cultivation of the soil.

The guarantee given with each Deering machine has year after year held the fullest confidence of the buyers. These machines have yearly saved millions of dollars to the farmers of the civilized world, where they are worked. The Deering Binders have saved this country alone, untold sums; it is their highest ambition to assist the intelligent farmer in gathering the crops of the future, which it is most earnestly hoped may be largely increased and largely bettered beyond those of the present time.

THE WEALTH OF THE HAY CROP.

The Commissioner of Agriculture in one of his reports says that the grass crop, green and dry, is worth more than any other in the country. The hay is worth far less than the pasturage in intrinsic value, and yet hay produces an overwhelming proportion of the growth in flesh of all animals, and bears an important part in the fattening and furnishing of beeves.

The hay crop may be safely estimated at 50,000,000 tons per year, which at an average price of $10 per ton amounts to the enormous sum of FIVE HUNDRED MILLION DOLLARS! The farmer can always get rid of his hay, because he can feed it into beef, and the beef can be exported if wheat can not. Besides being an article which finds ready sale, hay will rest and recuperate lands worn out by constant wheat cropping. The intelligent farmer will avoid depleting the land by constant wheat and corn cropping, and will rest the soil by a suitable rotation of crops, among which the clover and grasses should have a prominent place. By this means lands can be kept in a normal state of fertility that will yield a generous reward to the husbandman's toil. By following this system of rotation in crops the farmer will need a mower to cut his grass. Wm. Deering & Co. have the best and most complete line of mowing machines ever offered to farmers, consisting of Deering Wide-Cut Mowers, and Deering Narrow-Cut Mowers. The Deering Giant Front-Cut Mower, cutting 5, 6, and 7 feet, will cut almost double as much as an ordinary mower, and it leaves the grass in splendid condition for rapid drying.

The Deering Giant Rear-Cut Mower, cutting a 6 and 7 foot swath, has made a grand record by its perfect work and light draft.

The Deering Mower, with perfect fitting gear and long bearings (these bearings have been lengthened still further for 1886), is a genera favorite in American meadows.

The Improved Deering Mower is a light mower with high drive wheels, and simple gearing, and is sure to please.

Send for a special circular describing all the Deering Mowers.

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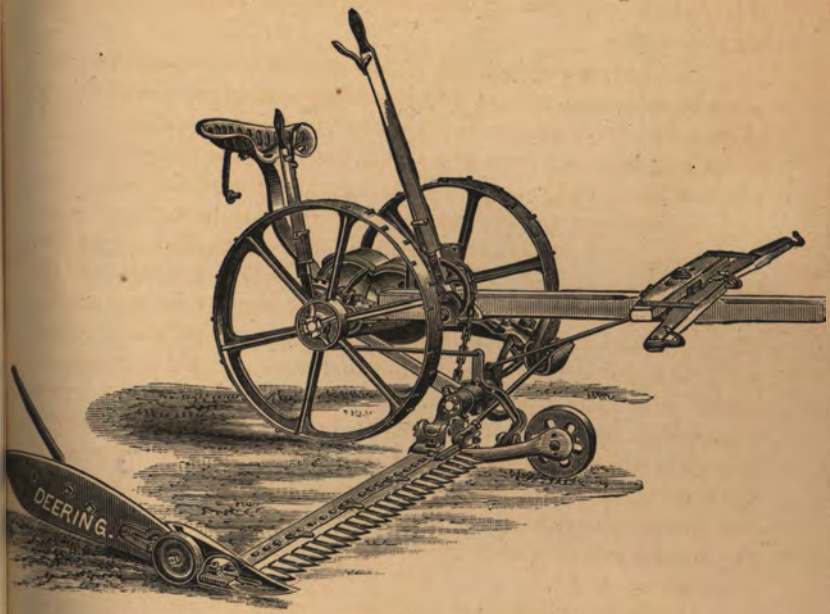
about any or all of the Deering machines; Sent Free.



THE DEERING MOWER.


W. E. Burrows, Agt.,
Brighton, N. Y.
THE JUNIOR DEERING
THE DEERING TWINE BINDER AND HARVESTER WITH BUNDLE CARRIER.