

## CHAPTER XII.

BILLS OF MATERIALS TO BE PROVIDED FOR BUILDING  
AND CONSTRUCTING THE MACHINERY.

## ARTICLE 102.

*For a Wheat Elevator 43 feet high, with a Strap 4 inches wide.*

Three sides of good, firm, white harness-leather.

220 feet of inch pine, or other boards that are dry, of about  $12\frac{1}{2}$  inches width, for the cases; these are to be dressed as follows:

86 feet in length, 7 inches wide, for the top and bottom.

86 feet in length, 5 inches wide, with the edges truly squared, for the side boards.

A quantity of inch boards for the garners, as they may be wanted.

Sheet-iron, or a good but of willow wood, for the buckets.

2000 tacks, 14 and 16 ounce size, the largest about half an inch long, for the buckets.

3 lbs. of 8 penny, and 1 lb. of 10 penny nails, for the cases.

2 dozen of large, wooden screws, (but nails will do,) for pulley cases.

16 feet of 2 inch plank, for pulleys.

16 feet of ditto, for cog-wheels, and dry pine scantling,  $4\frac{1}{2}$  by  $4\frac{1}{2}$ , or 5 by 5 inches, to give it motion.

*Smith's Bill of Iron.*

1 double gudgeon  $\frac{3}{4}$  inch, (such as fig. 6, Plate VI.,) 5 inches between the shoulders,  $3\frac{3}{4}$  inches between the holes, the necks, or gudgeon part, 3 inches.

1 small gudgeon, of the common size,  $\frac{3}{4}$  inch thick.

1 gudgeon, an inch thick, (fig. 7,) neck  $3\frac{1}{4}$ , tang. 10 inches, to be next the upper pulley.

2 small bands,  $4\frac{1}{4}$  inches from the outsides.

1 harness-buckle, 4 inches from the outsides, with 2 tongues, of the form of fig. 12.

Add whatever more may be wanting for the gears, that are for giving it motion.

*For a Meal Elevator 43 Feet high, Strap  $3\frac{1}{2}$  Inches wide, and a Conveyer for two pair of Stones.*

270 feet of dry pine, or other inch boards, most of them  $11\frac{1}{2}$  or 12 inches wide, of any length, that they may suit to be dressed for the case boards, as follows:

86 feet in length,  $6\frac{1}{2}$  inches wide, for tops and bottoms of the cases.

86 feet in length,  $4\frac{1}{2}$  inches wide, for the side boards, truly squared at the edges.

The back board of the conveyer trough 15 inches, bottom do. 11 inches, and front 13 inches wide.

Some 2 inch plank for the pulleys and cog-wheels.

Scantling for conveyers 6 by 6, or  $5\frac{1}{2}$  by  $5\frac{1}{2}$  inches, of dry pine or yellow poplar, (prefer light wood;) pine for shafts,  $4\frac{1}{2}$  by  $4\frac{1}{2}$ , or 5 by 5 inches.

$2\frac{1}{2}$  sides of good, pliant, harness leather.

1500 of 14 ounce tacks.

A good, clean butt of willow for buckets, unless the pieces that are left, which are too small for the wheat-buckets, will make the meal-buckets.

4 lbs. of 8 penny, and 1 lb. of 10 penny nails.

2 dozen of large wood screws, (nails will do,) for the pulley cases.

*Smith's Bill of Iron.*

1 double gudgeon, (such as fig. 4, Plate VI.,)  $1\frac{1}{2}$  inches thick,  $7\frac{1}{2}$  inches between the necks,  $3\frac{1}{4}$  between the key-holes, the necks  $1\frac{1}{2}$  inches long, and the tenons at each end of the same length, exactly square, that the socket may fit every way alike.

2 sockets, one for each tenon, such as appears on one end of fig. 4. The distance between the outside of the straps, with the nails in, must be  $5\frac{1}{4}$  inches; fig. 5 is an end view of it, and the band that drives over

- it at the end of the shaft, as they appear on the end of the conveyer.
- 2 small  $\frac{3}{4}$  inch gudgeons for the other ends of the conveyers.
- 4 thin bands  $5\frac{1}{2}$  inches from the outsides, for the conveyers.
- 1 gudgeon an inch thick, neck  $3\frac{1}{4}$  inches, and tang. 10 inches, for the shaft in the upper pulley; but if a gudgeon be put through the pulley, let it be of the form of fig. 6, with a tenon and socket at one end, like fig. 4.
- 1 harness-buckle,  $3\frac{1}{2}$  inches from the outsides, with two tongues; such as fig. 12, Plate VI.
- Add whatever more small gudgeons and bands may be necessary for giving motion.

*For a Hopper-Boy.*

- 1 piece of dry, hard, clean, pine scantling,  $4\frac{1}{2}$  by  $4\frac{1}{2}$  inches, and 10 feet long, for the upright shaft.
- 1 piece of dry poplar, soft pine, or other soft, light wood, not subject to crack and split in working, 8 by  $2\frac{1}{2}$  inches, 15 or 16 feet long, for the flight arms.
- Some 2 inch plank for wheels, to give it motion, and scantling  $4\frac{1}{2}$  by  $4\frac{1}{2}$  inches for the shafts.
- 60 flights, 6 inches long, 3 inches wide, and  $\frac{1}{2}$  inch at one, and  $\frac{1}{4}$  at the other edge, thinner at the fore than hind end, that they may drive in tight like a dove-tail wedge. These may be made out of green, hard maple, split from sap to heart, and set to dry.
- Half a common bed-cord, for a leading line, and balance rope.

*Smith's Bill of Iron.*

- 1 stay-iron, C F E, Plate VII. fig. 12. The height from the top of the ring F, to the bottom of the feet C E, is 15 inches; distance of the points of the feet C E 24 inches; size of the legs  $\frac{1}{2}$  by  $\frac{3}{4}$  inch; size of the ring F, 1 by  $\frac{1}{4}$  inch, round and smooth inside; 4 inches diameter, the inside corners rounded off, to keep it from cutting the shaft; there must be two little loops, or

- eyes, one in each quarter, that the balance rope may be hung to either.
- 2 screws with thumb-nuts, (that are turned by the thumb and fingers)  $\frac{1}{4}$  of an inch thick, and 3 inches long, for the feet of the stay-iron.
- 2 do. for the end flights,  $3\frac{1}{2}$  inches long, rounded  $1\frac{1}{2}$  inches next the head, and square  $1\frac{1}{4}$  inches next the screw, the round part thickest.
- 2 do. for the end sweepers,  $6\frac{1}{4}$  inches long, rounded 1 inch next the head,  $\frac{1}{4}$  inch thick.
- 2 do. for the hopper sweepers,  $8\frac{1}{2}$  inches long, and  $\frac{1}{4}$  inch thick, or long nails, with rivet heads, will answer the purpose.
- 1 step-gudgeon, (fig. 15,)  $2\frac{1}{2}$  inches long below the ring, and tang 9 inches,  $\frac{3}{4}$  inches thick.
- 1 plate, 4 by 4, and  $\frac{1}{8}$  inch thick, for the step-gudgeon to pass through, (fig. 14.)
- 1 band for the step-gudgeon,  $3\frac{3}{4}$  inches diameter; from the outsides it has to pass through the stay-iron.
- 1 gudgeon and band, for the top of the shaft, gudgeon  $\frac{3}{4}$  inch, band 4 inches diameter, measuring the outside.

The smith can, by the book, easily understand how to make these irons; and the reader may, from these bills of materials, make a rough estimate of the whole expense, which he will find trifling, compared with their utility.

### ARTICLE 103.

#### A MILL FOR CLEANING AND HULLING RICE.

Fig. 2, Plate X. The rice brought to the mill in boats, is to be emptied into the hopper 1, out of which it is conveyed by the conveyer into the elevator at 2, which elevates it into the garner 3, on the third floor; thence it descends into the garner 4, which hangs over the stones 5, and supplies them regularly. The stones are to be dressed with a few deep furrows, with but little draught, and picked full of large holes; they must be set

more than the length of the grain apart. The hoop should be lined inside with strong sheet-iron, and this, if punched full of holes, will be thereby improved. The grain is to be kept under the stone as long as necessary; this is effected by forcing it to rise some distance up the hoop, to be discharged through a hole, which is to be raised, or lowered, by a gate sliding in the bottom of it.

The principle by which the grains are hulled, is that of rubbing them against one another, between the stones, with great force; by which means they hull one another without being much broken by the stones. As the grain passes through the stones 5, it should fall into a rolling-screen or shaking-sieve 6, made of wire, with such meshes as will let out all the sand and dust, which may, if convenient, run through the floor into the water; the rice, and most of the heavy chaff, should fall through into the conveyer, which will convey it into the elevator at 2. The light chaff, &c., that does not pass through the sieve, will fall out at the tail, and, if useless, may also run into the water and float away. There may be a fan put on the spindle, above the trundle, to make a light blast, to blow out the chaff and dust, which should be conveyed out through the wall; and this fan may supersede the necessity of the shaking-sieve. The grain and heavy chaff are to be elevated into garner 7; thence they are to descend into garner 8, and pass through the stones 9, which are to be fixed and dressed in the same way as the others, but are to rub the grain harder. The outside of the chaff, from its sharpness, will cut off all the inside hull from the grain, and leave it perfectly clean: as it falls from these last stones, it passes through the wind of the fan 10, fixed on the spindle of the stones 9, which will blow out the chaff and dust, and they then drop into the room 21; the wind should escape through the wall. There is a regulating board that moves on a joint at 21, so as to take all the grain into the conveyer, which will convey it into the elevator at 11, which elevates it into the garner 12, to pass through the rolling screen 13; this should have meshes of three different sizes; first, to take out the dust, which falls into part 17, by itself; secondly, to pass

the small rice into apartment 16; the whole grains then fall into garner 14, perfectly clean, and are drawn into barrels at 15. The fan 18 blows out the dust, and lodges it in the room 19, and the wind passes out at 20; the head rice falls at the tail of the screen, and runs into the hopper of the stones 5, to go through the whole operation again. Thus, the whole work is completely performed by the water, with the help of the machinery, taking it from the boat, and operating upon it until it be put into the barrel, without the least manual labour.

Perhaps it may be advantageous to make a few furrows in the edge of the stone, slanting, at an angle of about 30 degrees with a perpendicular line; these furrows will throw up the grain next the stone, on the top of that in the hoop, which will change its position continually; but this, probably, may not be found necessary.

