APPENDIX,

CONTAINING

A Description of a Merchant Flour Mill, on the most approved Construction, with the recent Improvements, with two additional Plates,

BY CADWALLADER AND OLIVER EVANS, ENGINEERS;

AND

EXTRACTS

FROM SOME OF THE BEST MODERN WORKS ON THE SUBJECT OF MILLS, WITH OBSERVATIONS BY THE EDITOR.

Description of a Merchant Flour Mill, driving four Pairs of five feet Mill-Stones; arranged by CADWALLADER *and* OLIVER EVANS, *Engineers, Philadelphia.*

PLATE XXVII.

1—A hollow cast-iron shaft, circular, 15 inches in diameter, except at those points where the water and main bevel wheels are hung, where it is increased to 19 inches in diameter. The water-wheel is secured on this shaft by 3 sockets, as represented in Plate XXVIII., fig. 3, and makes 10 revolutions per minute.

2—The main driving bevel-wheel, on the water-wheel shaft, 8 feet in diameter, to the pitch line; 100 cogs, 3 inches pitch, and 8 inches on the face; revolving 10 times per minute, and driving.

3—A bevel-wheel on the upright, 4 feet in diameter to pitch line; 50 cogs, same pitch and face of cogs as above, revolving 20 times per minute.

4—The large pit spur-wheel, making 20 revolutions per minute, 9 feet $\frac{1}{5}$th inch diameter, to pitch line; 114

cogs, 3 inches pitch, face 10 inches; this wheel gives motion to

5, 5, 5, 5—Four pinions on the spindles of the mill-stones, 18,1 inches in diameter to pitch line, 19 cogs, same face and pitch.

6, 6, 6, 6—Iron upright shafts, extending the height of the building, and coupled at each story.

7, 7, 7, 7—Are 4 pairs of five feet mill-stones, making 120 revolutions per minute. Two of them shown in elevation; and the position of the 4, shown in Plate XXVIII. as represented by the dotted lines, fig. 1.

8—A pulley on the upright shaft, which, by a band, gives motion to

8—The fan for cleaning grain, revolving 140 times per minute, wings 3 feet long, 20 inches in width.

9—A bevel wheel 2 feet diameter, cogs 2 inches pitch, face 2,5 inches, on the upright shaft, gearing into a bevel wheel, the face of which is shown, drives the bolting screen 18 revolutions per minute.

10—A bevel wheel on upright shaft, 56 cogs, 2 inches pitch, 2,5 inches face, gearing into

10—A bevel wheel on the shaft of the bolting reels, 31 cogs, same pitch and face.

10, 10—Are two of four bolting reels shown, 18 feet long, 30 inches diameter, revolving 36 times per minute.

11—A large pulley on the upright shaft, which, by a band, gives motion to the rubbing stones 11.

12—A bevel wheel, on the top of the upright shaft, gearing into

12—A bevel wheel, on the horizontal shaft, at one end of which is

13—A bevel wheel, 1 foot diameter, gearing into a bevel wheel

14—of 5 feet diameter, which reduces the motion of the hopper-boy down to 4 revolutions per minute, which sweeps a circle of 20 feet.

15—Meal elevator attending 4 pairs of stones.

16—Grain elevator.

17—Packing-room and press.

PLATE XXVIII.

Figure 1.

A bird's eye view of the mode of giving motion to 4 pairs of mill-stones.

4—The large pit spur-wheel, driving at equal distances on its periphery, the pinions

5, 5, 5, 5—attached to the spindles of the mill-stones.

7, 7, 7, 7—Mill-stones, 5 feet diameter, represented by dotted circles.

Figure 2.

An enlarged view of the couplings of the upright shaft. They are of cast-iron, with their holes truly reamed, to receive the ends of the iron upright shafts.

2—The face of a coupling, divided into 6 equal parts, radiating from the centre: three of the parts project, and three are depressed; so that when two of them are coupled, the projections of one will fill the depressions in the other, as 1, the coupling connected.

Figure 3.

A cast-iron socket for the water-wheel; it is a plate $\frac{3}{4}$ths of an inch thick; the eye for the shaft to pass through, $1\frac{1}{4}$ inch thick, and 12 inches deep: the sockets, for receiving the arms, are 14 inches long, and have projections 5 inches deep; 3 3 3, &c., are the projections; the intermediate space, between the sockets, are cut out to lessen the weight of metal, but in such a manner as to preserve the strength. It requires three of these sockets for a large water-wheel; the arms for receiving the buckets, are dressed to fit tightly in the sockets, and secured firmly by bolts, as 2 2.

Figure 4,

Is an arm for the water-wheel, as dressed; 1, the end to be bolted in the socket; 2, the end for screwing on the bucket.

The advantages of this mode of constructing water-

wheels, is, that the shaft is not weakened, by having mortises cut in to receive the arm: that it is not so liable to decay, and if an arm, or bucket, be destroyed by accident, they can be dressed out, and the mill stopped, only while you unscrew the broken part, and replace it by a new one.

Figure 5.

An elevation of the flour press. 1, the barrel of flour; 2, the funnel; 3 3, the driver; 4 5, the lever; 4 3, the connecting bars, fastened by a strong pin to each side of the lever, at 4, and to the driver at 3. 6, a strong bolt, passing through the floor, and keyed below the joist: there is a hole in the upper part of the bolt, to receive a pin which the lever works on, which, when brought down by the hand, moves the pin 4, in the dotted circle; the connecting bars drawing down the driver 3 3, pressing the flour into the barrel; and as it becomes harder packed, the power of the machine increases; as the pin 4 approaches the bolt 6, the under sliding part of the lever is drawn out, to increase its length; and is assisted in rising by a weight fastened to a line passing over pulleys.

When the pin 4 is brought down within half an inch of the centre of the bolt 6, or plumb line, the power increases from 1 to 288; and with the aid of a simple wheel and axis, as 1 to 15, from 288 to 4320; or, if the wheel and axis be as 1 to 30, it will be increased to 4320; that is to say, one man will press as hard with this machine as 8640 men could do with their natural strength. It is extremely well calculated for cotton, tobacco, cider, or, in short, any thing that requires a powerful press.

Operation of the Mill:—The grain, after having been weighed, by drawing a slide, is let into the grain elevator 16, then hoisted to the top of the building, and by a spout moving on a circle, can be deposited into spouts leading to any part of the mill, when wanted for use: by drawing sliders in other spouts, converging to the grain elevator 16, it can be re-elevated, and thrown into the hopper of the rubbing stones 11; after passing through which, it descends into the bolting screen 9, and when