2 Sheets. Sheet 1.

R. Murdock,

Dressing Stones.

No. 6,523. Patented June 12, 1849.

Fig. 1 (1)

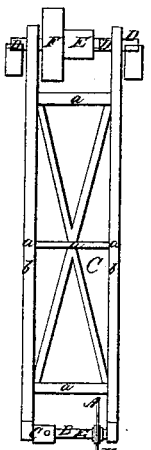


Fig. 1 (2)

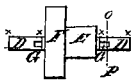


Fig. 1 (3)

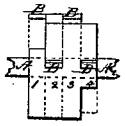


Fig. 1

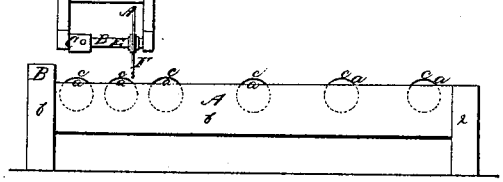


Fig. 8

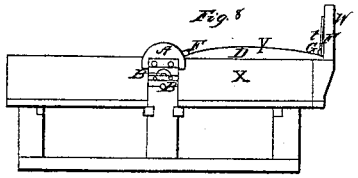


Fig. 9

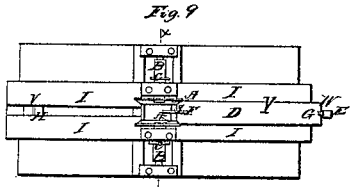


Fig. 10

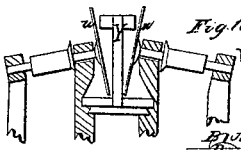


Fig. 12

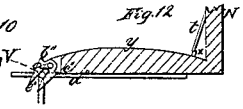


Fig. 11

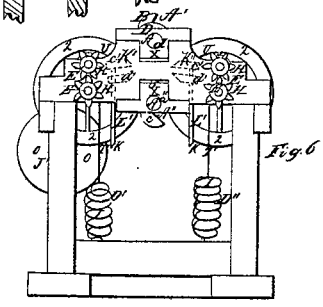
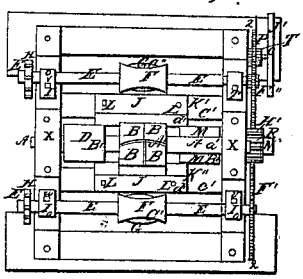


Fig. 6

Fig. 7.



2 Sheets. Sheet 2

R. Murdock,

Dressing Stares.

No. 6,523. Patented June 12, 1849.

Fig. 2

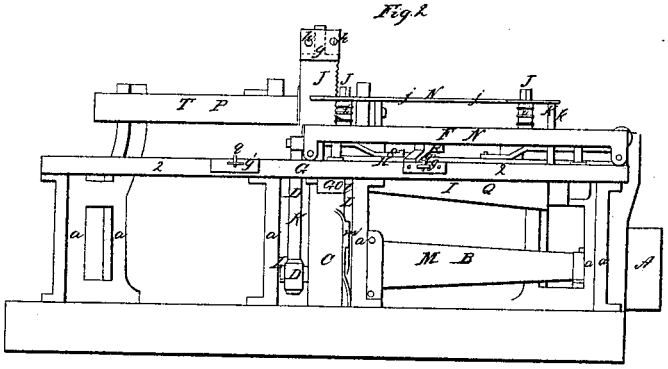


Fig. 3

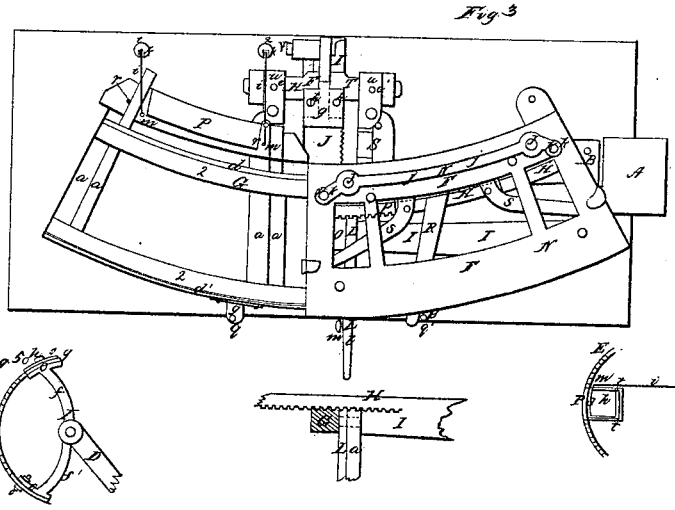
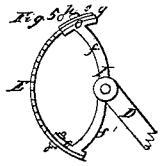


Fig. 5



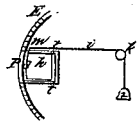
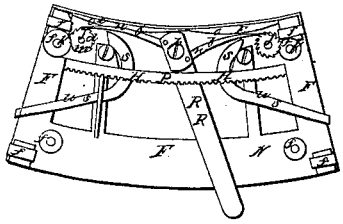


Fig. 4



UNITED STATES PATENT OFFICE.

RUEBEN MURDOCK, OF ROCHESTER, NEW YORK.

BARREL MACHINERY.

Specification of Letters Patent No. 6,523, dated June 12, 1849.

To all whom it may concern:

Be it known that I, REUBEN MURDOCK, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Machinery for Manufacturing Staves, whereof the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of the cross-cutter; Fig. 2, an elevation of the sawing machine; Fig. 3, a plan of the same; Fig. 4, a view of the carriage reversed to show the feeding apparatus; Fig. 5, a side view of the saw frame; Fig. 6, a side view of the dresser; Fig. 7, a plan of the same; Fig. 8, a side view of the jointer; Fig. 9, a plan of the same; Fig. 10, a cross section of the same at the line *x x* of Fig. 9; Fig. 11, is a view of the bottom of the carriage of the jointer, and Fig. 12, a vertical longitudinal section of the same at the line 1, 1, of Fig. 11.

(Note.—The letters referred to throughout this specification, are in red ink on the drawings, those in black ink being referred to in the old papers.)

The object of my improved machinery is the production of a smooth stave having both its cross and longitudinal sections correctly curved, and the edges correctly beveled and jointed so as to fit it for the hoops.

My stave machinery is composed of four members. The first receives the plank from the saw mill and cross-cuts it into slabs equal in length to that of the intended stave. The second saws the slab lengthwise, producing a stave curved both transversely and longitudinally. The third joints its edges, giving them their proper bevel, and tapering the stave from the center in each direction to the ends. The fourth dresses the stave smooth on both sides.

The cross cutter (Fig. 1,) has a horizontal bench or frame A firmly secured to the floor of the building. This frame is crossed by friction rollers *a*, *a*, whose peripheries project above its upper surface, and at one end is secured the gage bar B projecting above the friction rollers. The saw frame C is suspended above the bench and swings across it, this saw frame is formed of two side pieces *b*, *b*, connected by suitable cross ties and braces, is suspended from a horizontal shaft D and descends to within a short distance of the top of the bench; at the lower extremity of this swing frame is the horizontal shaft E of the circular saw F whose plane of motion is at right angles to the length and surface of the bench. A belt pulley *c* is mounted on the saw shaft and a corresponding one on the shaft of the swing frame, these two being connected by a belt; and a second pulley mounted on the shaft of the swing frame receives motion from the driver. The position of the saw with respect to the gage bar is such that the distance between them shall be equal to the length of slab required.

To use this machine swing the saw to one side of the bench, shove on the plank endwise, until the shortest portion of its irregular extremity is opposite the edge of the saw, then press the swing frame toward the plank; as soon as the saw touches it will commence cutting the plank, and by the continued pressure will pass transversely through it, cutting off a block, and thus squaring the end of the plank. The plank is now shoved endwise, until the squared end touches the gage bar, when the saw frame is again swung across the bench, cutting off a slab equal in length to the distance between the gage and the saw; the swing frame being withdrawn, and the sawed slab removed, the plank is again shoved endwise against the gage, and the operation continued as before, until it is entirely cut up into slabs. The slabs are then fixed to a carriage moving in a circular arc, and subjected endwise to the action of an oscillating curved saw, whose plane of oscillation passes through the radius of the arc, and is at right angles with the plane in which the carriage moves. In Figs. 2 and 3, G represents the curved frame of the machine to which the other portions are attached. To the top of this frame are attached two circular railways *d d'* concentric with each other. To the inner side of the bench are secured the supports *e*, *e'* of the saw shaft H. On this shaft is mounted the saw frame I formed of two radial arms *f*, *f'*; to the lower, the lower extremity of the curved saw J is firmly secured. The upper extremity of the saw is clamped to the upper arm *f*, of the saw frame by a spring plate *g*, secured by two screws *h*, *h*, the saw ends in a tongue which passes between the screws; the spring clamp presses on the whole width of the saw, thus securing it more perfectly than if it was merely screwed to the frame, at the same time the elasticity

of the spring plate, allows a little play in the saw, which in fast motions prevents the fracture of the saw blade at the edge of the frame. The radius of the saws longitudinal curvature is 1/11th longer than the radius of the barrel at its largest part. The saw has also a curved cross section, the curve of which is the same as that of the stave in the direction of its length. The back of the saw moves in a vertical plane; the cutting edge has a rake of about $\frac{1}{4}$ of an inch, the upper extremity of the saw being that much wider than the lower. An oscillating motion is given to the saw by connecting its frame by a pitman K with a crank L on the extremity of a horizontal shaft M beneath the circular railways.

On the railways *d*, *d'*, runs the feed carriage N having the form of a segment of a ring whose inner edge just clears the saw. The slabs from the cross cutter are secured to the top of this carriage by introducing their ends between two revolving dogs *i*, *i*, situated at the opposite extremities of the inner edge of the carriage; above the inner edge of the carriage is the bar *j* supported on standards *k*, and by which the upper extremities of the axes of the dogs are supported. A direct motion is given to the carriage by an endless screw O (attached to the frame G) working in a rack P attached to the carriage. To produce a retrograde motion the screw is disengaged from the rack by the lever *l*, acting on its axis, and the carriage is brought back to its first position by a descending weight, the strap of which passes over a pulley at the end of the frame G and is attached to the carriage. The endless screw is on a shaft Q parallel with the crank shaft M of the saw, and receives motion from it by a belt, the belt pulleys are reversed cones, so that the speed of the carriage can be regulated according to the toughness and hardness of the wood.

In order to cut consecutive staves from the same slab, a rotary motion must be given to the revolving dogs. The arrangement for this is beneath the bottom of the carriage, and is as follows—A ratchet wheel *m* is attached to the axis of each dog, against the ratchet teeth the pawls *n* are pressed by the springs *o*. The opposite extremities of these pawls, are connected with a vibrating lever R at equal distances on the opposite sides of its axis *p*. This lever extends transversely across the carriage and projects beyond its outer edge; the projecting arm by the motion of the carriage comes in contact alternately with the pins *q*, *q'* attached to the frame. By the pin *q* it is kept stationary during the last portion of the direct motion of the carriage, and the pawls fastened to the lever are drawn toward each other, their outer extremities slipping over the inclined faces of the teeth of the ratchet wheels *m*, *m*; in the retrograde motion of the carriage the projecting arm of the lever comes in contact with the pin *q'*, and the pawls being moved from each other catch in the radial edges of the ratchet teeth and revolve the dogs in opposite directions, thereby forcing the slab toward the saw. It is evident that as this movement of the slab takes place before the retrograde motion of the carriage is completed, it will be pressed violently against the saw, and if the carriage could not move outward from the saw a breakage must ensue; to obviate this difficulty I allow the carriage in its retrograde motion to move a sufficient distance outward from the saw, to allow the slab to clear it; and when the end of the slab by the completion of the retrograde motion of the carriage has passed the saw the carriage is pushed into its proper position for sawing the stave by the action of the lever *l* which throws the endless screw O into gear with the rack. I prefer to have the timber sawed at the mill into four inch plank, and the axis of my saw shaft is about half that distance above the plane of the top of the feed carriage. To prevent accidents, I attach a guard S to the support *e'* of the saw shaft proceeding the cutting edge, and through this guard the slab passes to the saw. A curved case T is attached to the frame G immediately following the saw to receive the sawed stave. In this case are two inclined gates *r*, *r*, pressed against the back of the case by weights or otherwise, these serve to steady the sawed end of the stave, and prevent it from falling when detached from the slab, and in this case it remains until pushed out by the succeeding stave. In order to introduce the sawed slab between the dogs, the pawls *n*, *n*, are disengaged from the ratchet teeth by the lever U whose longer arms extend beyond the carriage, the slab is then presented to the dogs which are turned by applying a wrench to the upper extremities of their axis which project above the bar *j* and are squared. The dogs are thus turned until the slab is in the proper position to receive the first cut of the saw. The thickness of the stave may be varied by altering the pitch of the teeth of the ratchet wheels *m*.

The sawed stave next proceeds to the jointer Figs. 8, 9 and 10. The operation here effected is giving the proper level to the edges of the stave, and at the same time tapering its breadth in each direction from the center. This is performed by attaching the frame to a reciprocating carriage, and passing it endwise between two circular saws whose planes of motion are inclined to each other. The carriage Y is composed of a block curved both lengthwise and crosswise to correspond with the inner surface of the stave, and of a flat bottom running on ways

beneath the saws, and which from its position can be made sufficiently wide to ensure stability and prevent the vibrating motion which would result from a too narrow support. The stave is secured to the carriage at the end first passing the saws, by a self acting dog *s*. This is formed of a plate *a''* turning at one end on a pivot by which it is attached to the carriage; a notch *b''* is made in the upper edge of the plate above the pivot to receive the end of the stave, and a second notch *c''* is made in the lower edge below the pivot in which catches the spring detent *d''* attached to the bottom of the carriage. By this detent the dog is held against the stave. The projecting arm of the dog is inclined downward and slotted *e''*. At the end of the carriage last passing the saws a standard W, is secured, to the upper extremity of this standard is attached a spring *t* projecting downward, and having a shoulder *x* near its lower extremity beneath which the end of the stave is received. The carriage runs on a horizontal bench X to which the other portions of the machine are secured, and receives a reciprocating motion from a rack and pinion or other analogous device, by this motion it is propelled between the inclined faces of two circular saws, *u*, *u*, whose planes of motion meet below the center of the carriage. The saws are directly opposite each other, and act simultaneously on the opposite edges of the same stave, the bottom of the carriage moves in a horizontal plane, and as its upper surface is higher in the middle than at the two ends, it is obvious that the part of the stave resting on this portion of the carriage, must pass between the saws at a point where from their inclined position with respect to each other, their cutting edges are farther apart than they are at the points where the ends of the staves pass between the saws; and if the saws be inclined to each other at an angle equal to that formed by the opposite beveled edges of a stave, it is obvious that the edges of a stave subjected to the machine, will be suitably beveled and jointed to make a tight joint when the staves are put together. To increase or diminish the bilge of the staves the top of the carriage must be made more or less crowning. After the stave by the direct motion of the carriage has cleared the saws the arm *f''* of the detent striking a pin *v* at the end of the bench withdraws it from the lower notch of the dog, at the same time the slot in the projecting arm of the dog, coming in contact with the pin *v*, is depressed, and that end of the stave being liberated, the spring *t* at the opposite end of the carriage ejects it from the machine. The carriage is then retrograded and another stave is applied.

The jointed stave is then introduced in the dresser. This resembles a planing machine with a cylindrical cut, and is represented in Figs. 6 and 7. Two sets of cutters A', A'' are mounted on two shafts *a' a''* parallel to each other. The cutters of each set have their edges curved, the curve of one set being concave to smooth the cylindrical exterior of the stave; the other set having their cutting edges curved to dress the interior curve of the staves. These two sets of cutters revolve in opposite directions and are driven by belt pulleys B', B'', mounted on their respective shafts, these shafts are at such a distance from each other that the space between the cutting edges shall be equal to the intended thickness of the finished stave. The staves are propelled between the revolving cutters by pressure feed rollers C', C'' one set of which C'' precedes the cutters, while the second C' follows them. The position of the shaft of one roller of each set is not changed by the action of the machine. The other roller rises and falls upon the first to adapt itself to any inequalities in the sawed stave, and is pressed upon the stave's surface by springs D', D''. As the sawed stave has a curved cross section it is necessary that the shape of the feed rolls should correspond with it, and accordingly one roll of each set is made bulging, and the other is hollowed, corresponding also in this respect with the convex and concave curves of the cylindrical cutters. The shafts of the feed rollers pass through the side framing of the dresser, and have pinions E' attached to them by which the two rolls of each pair are connected together. The extremities of one roll of each set are connected by the wheels F', F'' and pinion H'; motion is given to these wheels by the pinion I' on whose shaft a belt pulley J' is mounted. To hold the stave firm during the action of the cutters, and to guide it into its proper position between them, spring rests are attached to the frame, the one set K' preceding, the other K'' succeeding the cutters, each set being as near as possible to the cutting edges. Each set is composed of two bars, the one *d'* fixed the other *c'* rising and falling on the first, toward which it is strongly pressed by springs L' so as to hold the stave perfectly firm during the action of the cutters. The sawed staves are introduced through one set of feed rollers C'' and passing through the spring rests and between the cutters, are thrown out by the other set of feed rollers C' perfectly smooth. This same dressing machine may be used for dressing sawed hoops by making a slight variation in its several parts.

The advantages of my stave machinery over those previously constructed, result from the arrangement of machinery by which the several processes are produced,

which are such that wood of any quality subjected to it may be cut into staves and delivered in a smooth and finished state. The several portions of each machine are perfectly simple, and from their position can be easily kept in repair, while the unprecedented rapidity with which the work is performed renders it far superior to any previously invented.

What I claim as my invention, and desire to secure by Letters Patent is—

1. I claim the combination of the revolving dogs (*m*), the pawls (*n*), the disengaging lever U, the vibrating feed lever R, and the stops *q*, *q'*, whereby the slab is secured on the carriage and successive staves sawed from the same slab.

2. I claim disconnecting the carriage (N) from the feed gear during its retrograde motion while the slab is being fed toward the saw (J), substantially in the manner and for the purpose herein set forth.

3. I likewise claim the combination of the oscillating saw (J) with the curved gated case (T), whereby the stave is securely held during the action of the saw in the manner and for the purpose herein set forth.

4. I likewise claim the combination of the stave carriage Y, with the spring dog *s*, and spring hold fast *t*, and stop *v*, whereby the stave is securely held down during the action of the saws, and then thrown from the machine.

5. I also claim the combination of the concave and convex pressure feed rollers (C', C'') and the self-adjusting spring clamps or rests (K', K'') with the concave and convex cutters (A', A''), when the several members are arranged in the curve of the longitudinal section of the stave as herein set forth.

REUBEN MURDOCK.

Witnesses:
P. H. WATSON,
E. S. RENWICK.