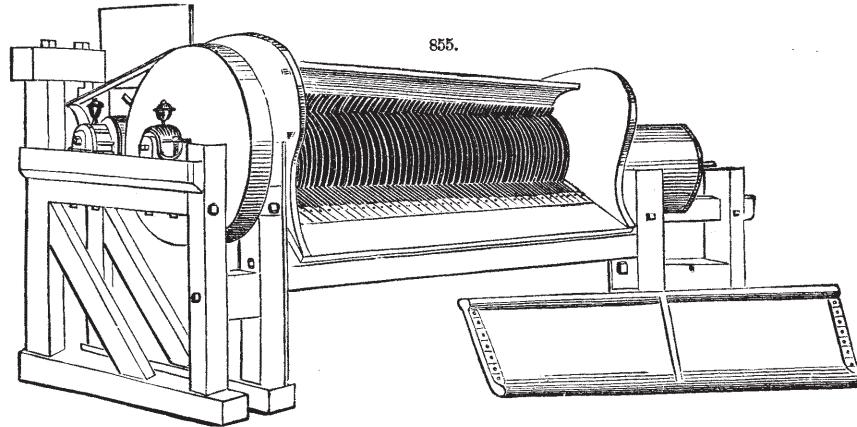


COTTON-GIN. A machine for cleansing cotton and preparing it for the market or for carding. The most simple as well as the most ancient cotton-gin is the roller-gin, which consists of fluted rollers about five-eighths of an inch in diameter, and from 9 to 16 inches long, placed parallel in a

frame, which keeps them almost in contact. The rollers revolve in opposite directions; the cotton is drawn through between the rollers, while the seeds are prevented from passing by the narrowness of the space. This machine is still used for the finer and longer-stapled cottons, but the operation is tedious and expensive; and the saw-gin, invented by Eli Whitney in 1793, from its general use, its wondrous effects on the extension of cotton cultivation, and its influence on manufactures and commerce, may now claim distinction and consideration almost exclusively as the cotton-gin. In its main features this machine still continues as first invented by Whitney; but in various details and workmanship it has been the subject of many improvements. Fig. 855 presents a perspective view of an improved cotton-gin, and Fig. 856 is a section of the same. In the latter, *a* is the grate-fall head, or end of breast; *b*, seed-board; *c*, saw-cylinder; *d*, saw; *e*, "patent detached grate;" *f*,



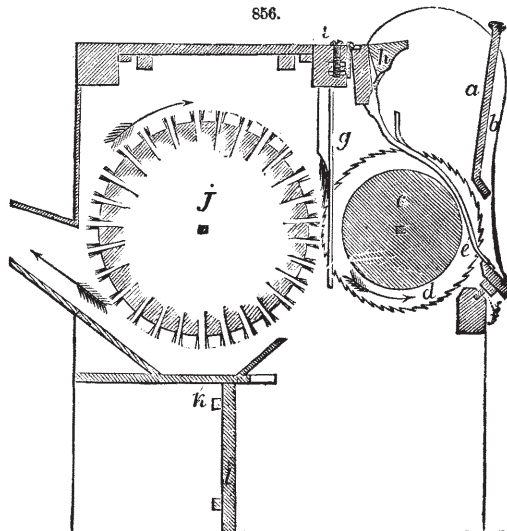
screw or bolt on which the grate-fall rests; *g*, back board, to which are attached the back grates and "patent moter;" *h*, grate-fall hollow, which is hung upon hinges, and may be raised or lowered at pleasure; *i*, sliding-butt, by means of which the saw-tooth may be made to assume any desired angle with the curved surface or front of the grate; *j*, "patent brush;" *k*, sliding mote-board; *l*, bottom board.

The grate-fall, or breast, into which the seed-cotton is thrown, is formed with ends or heads of cast-iron, and pear-shaped, the lower and back side being composed of cast-iron grates, screwed firmly to the wood-work of the breast; the saws project through the interstices between the grates from 1 to 2 inches; the upper and back part of the grate-fall, called the "hollow," is hung upon hinges, and may be raised or lowered at pleasure, and fastened in any desired position by joint-bolts through the grate-fall heads.

The seed-board makes the front part of the breast, and stands nearly perpendicular, leaving a space between it and the grates for the discharge of the seed; it is hung upon pivots at the top at each end, so that the bottom may be swung outward and the hopper emptied at any time. When in place the bottom is fastened by small slide-bolts. The position and angle of the seed-board may be readily varied and adjusted, by altering the position of the slides upon which the pivots rest. These slides are fixed to the grate-fall heads by small bolts passing through slots, having a nut outside.

The grate-fall, or breast, is hung to the front top timber of the frame by stout hinges above the saw-cylinder, and the lower part rests upon two short screws in the front piece. That part of the hinge or butt which is attached to the top timber is so fixed as to slide up or down by means of slots and an adjusting screw, and is fastened in the desired position by bolt-nuts.

The saw-cylinder is made of wooden staves, about 2 inches thick, upon an iron shaft, and turned in a lathe of a uniform diameter; and by the application of a small saw, when in the lathe, grooves are formed to receive the saw-segments, which are made of the best cast-steel, and inserted and fastened into these grooves.



There is a set of wooden grates behind the saw-cylinder, and a row of hair or bristles, called the "moter," to separate the false seeds, motes, and dirt from the ginned cotton.

The brush is made of about 20 inches diameter, cylindrical, having slits lengthwise between the rows of bristles and a hole around the shaft to receive the air as the brush revolves; and a rapid centrifugal motion is given to the air, which is forced out with great power between the rows of bristles.

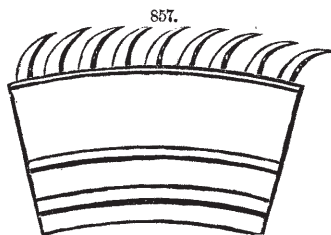
Behind the brush is an opening, the length of the frame, into the lint-room, and beneath the brush a sliding board, called the mote-board, which may be slid back or forward for the purpose of regulating the draft of the gin, and properly separating the motes, dirt, and leaf from the clean cotton.

In the saw-gin, as ordinarily constructed, the cotton is liable to collect in the spaces or interstices between the grates, and around them above the saws, thus choking or clogging the grates, and preventing the rising and free escape of the roll of seed-cotton. The patent detached grate, instead of being attached directly to the wood part of the breast at the top, has an arm or brace extending out behind, through which it is screwed to the wood, so that the top of the grate stands out and is detached from the wood, and has a space behind of a quarter inch or more between it and the wood, and also a space between it and the adjacent grates; so that there is no chance for the cotton to collect above the saws, and the choking is entirely avoided.

Many efforts have been made to improve the saw-gin, so as to separate motes and other impurities from the fibres of cotton. By some this has been essayed by means of rotating brushes acting on the fibres, and carrying them from the grate to the stripping-brush, rotating in a reverse direction to the saws. Some have used stationary brushes, through which the saws carry the fibres to be stripped of motes and other impurities. The objection to these is that they act on the cotton only when upon the teeth of the saws, and therefore, instead of separating the motes and other impurities from the fibres to which they adhere, sometimes with considerable tenacity, the fibres are drawn out with the motes, thus occasioning considerable loss of cotton. The object of the moter is to avoid this loss, and to hold on to the motes or other impurities, as the fibres are stripped from the saws by the stripping-brush, the fibres being under the operation of both brushes at the same time. The moter also more effectually stops the current of air generated by the rotation of the stripping-brush from acting on the fibres before they are cleaned, than if located at a greater distance from the point of action of the stripping-brush.

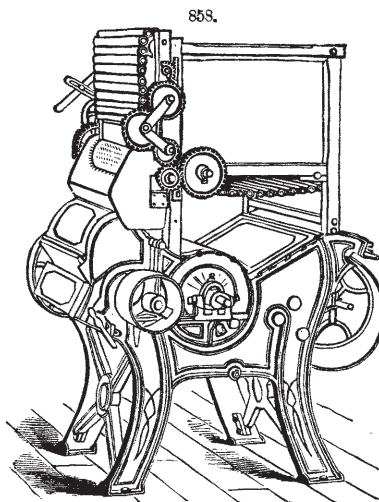
The Macarthy Gin is designed to clean large quantities of cotton expeditiously without occasioning any injury to the staple. The cotton is drawn, by a leather roller having shallow diagonal grooves which will not admit of the passage of a seed, between a metal plate called the "doctor," fixed tangentially to the roller, and a blade called the beater, moving up and down in a plane immediately behind and parallel to the fixed plate. While the cotton is drawn through by the roller, the seeds are forced out by the action of the movable blade. Numerous modifications of this gin have been made, and in some cases the movable blade or knife is made to work horizontally instead of vertically. The double-action gin has a double set of knives, set so as to balance each other, each revolution of the crank giving two strokes of the knife.

The Cowper Lock-Jaw Gin.—In this machine the jaw which locks fast the cotton fibre is formed by the nipping-blade, which is caused to approach and nip the fibre on the roller at the time it is traveling at the same surface speed and in the same direction. While the fibre is so held, the beater acts on and pushes away the seeds close to the nipping-blades, and separates them from the fibre close to the seed. The nipping-blade then returns to its former position, moving in the opposite



direction to the surface of the roller. A fresh supply of cotton is then drawn in and grasped, when the nip is repeated.

The Knife-Roller Gin.—This has the same roller as the Macarthy gin, with the steel blade or pressing knife pressed against its surface by springs and screws. A knife-roller is substituted for the beater-plate used in the Macarthy machine. It consists of a spindle carrying oval plates of about 5 inches in diameter. These plates are placed diagonally with the axis on which they are fixed; and being oval, when caused to revolve the blades or knives draw the cotton-seed alternately right and left along the edge of the pressing knife, while the ginning roller pulls away the fibre from the seed and it falls through a grating. There is a guard which prevents the seed from being broken between the ginning roller and the edges of the knives on the knife-roller.



The Scattergood Needle-Gin.—A notable improvement has been made in Scattergood's "needle-gin," in which the teeth are needle-pointed, and set in Babbitt metal, causing less injury to the staple than the old saws. The circles or rings of teeth are each composed of 10 sections, one of which can be easily replaced when injured. One of these gins, of 50 rows of teeth, will gin a bale of cotton per hour, and requires about 5 horse-power. The method of setting the teeth is shown in Fig. 857. The bent teeth necessary to form a section are placed in a mould, and the soft metal poured around them. The number of sections (10) required for a circle are then placed between two iron disks of the proper diameter, which fit into a groove on the section, and an axial hole in which also fits on the central shaft. This process is repeated until the desired length of cylinder is obtained, when by means of a screw cut on the shaft, and its proper nut, the whole cylinder is firmly drawn together.

This gin, having two-fifths more space between the teeth than the saw-gin for the same number of teeth, will at the same velocity clean a larger amount of cotton, while the rounded teeth will not injure the staple like those of the saw. It has also a self-acting feed-motion.

The machine, Fig. 858, has a box occupying the top of the gin. An endless rotating apron of slats forms the bottom, while an upright endless rotating apron of slats forms the front, and a rotating toothed roller forms the lower front corner. The lower apron brings the seed-cotton forward and against the toothed roller; the roller, having a slightly accelerated motion, seizes the cotton and carries it over itself, when it drops into the hopper of the gin. The upright apron lifts the superfluous cotton up and away from the roller, and keeps turning the whole mass of seed-cotton in the hopper over, thereby shaking out much of the dirt and sand and opening the cotton; by its action all tendency of the cotton to jam and choke in the machine is avoided. An easy adjustment of the upright apron changes the feed at the will of the operator.

Table showing claimed Capacity of various Cotton-Gins.

| NAME OF GIN. | Size. | Pounds of Cotton cleaned per Hour. | REMARKS. |
|-------------------------------------|----------|------------------------------------|---------------------------------|
| Whitney..... | 80-saw. | 90 | |
| Macarthy, hand machine..... | 12-inch. | 8 to 12 | |
| Same, single action..... | 40 " | 25 to 50 | |
| Same, self feeding, double action.. | 40 " | 30 to 80 | Maximum on long-stapled cotton. |
| Cowper lock-jaw, power..... | 30 " | 48½ to 76 | " " " |
| " " hand..... | 14 " | 21½ to 35 | " " " |
| Knife-roller..... | 40 " | 50 to 150 | |

For an account of a trial of cotton-gins in Manchester, England, in 1872, see *Journal of the Society of Arts*, xx., 252. These experiments show advantages in favor of the roller-gins. S. W. (in part).