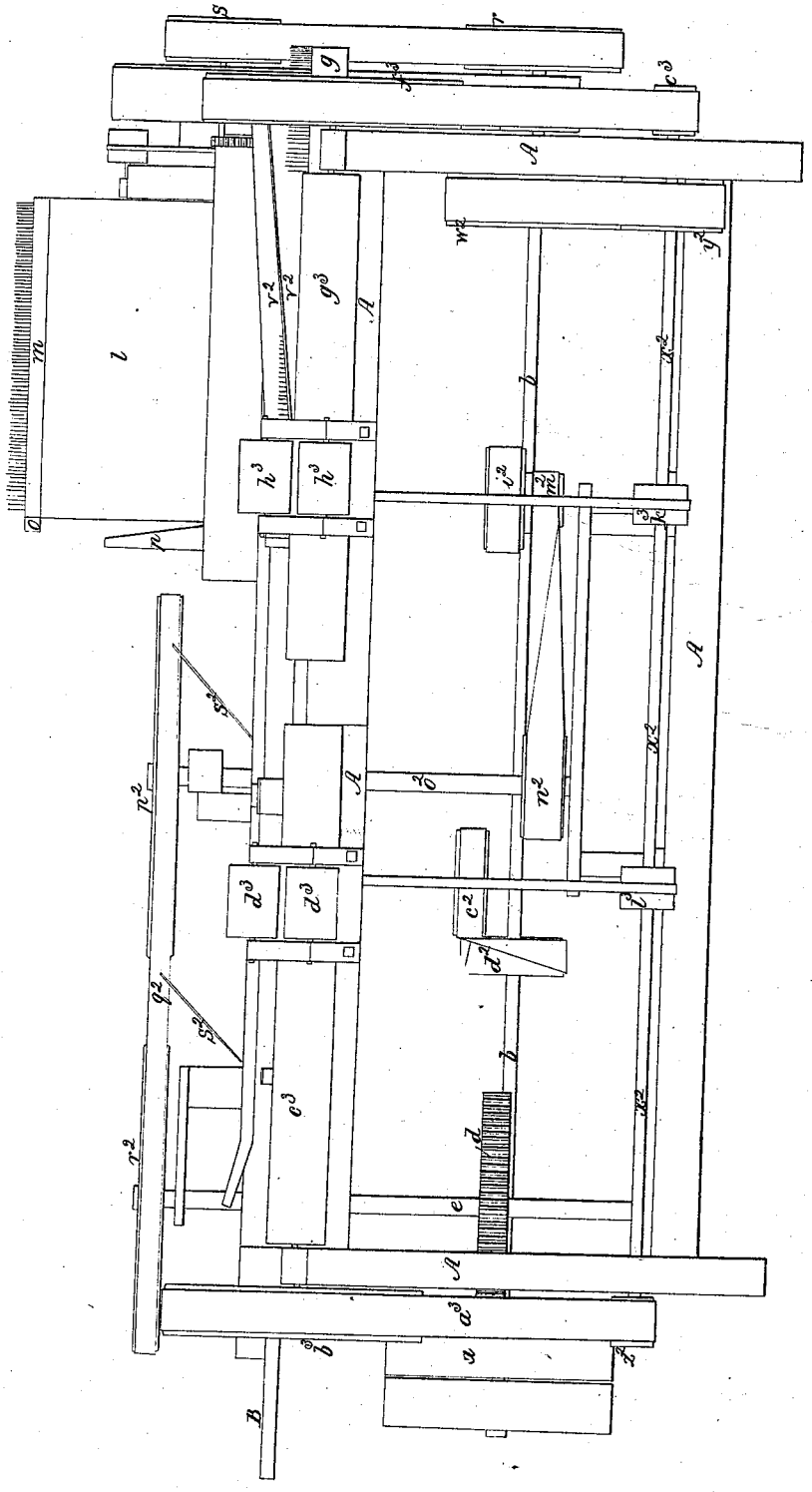
4 Sheets. Sheet 1.

S. Couillard, Jr.,
Combing Machine.

Patented Oct. 19, 1836.



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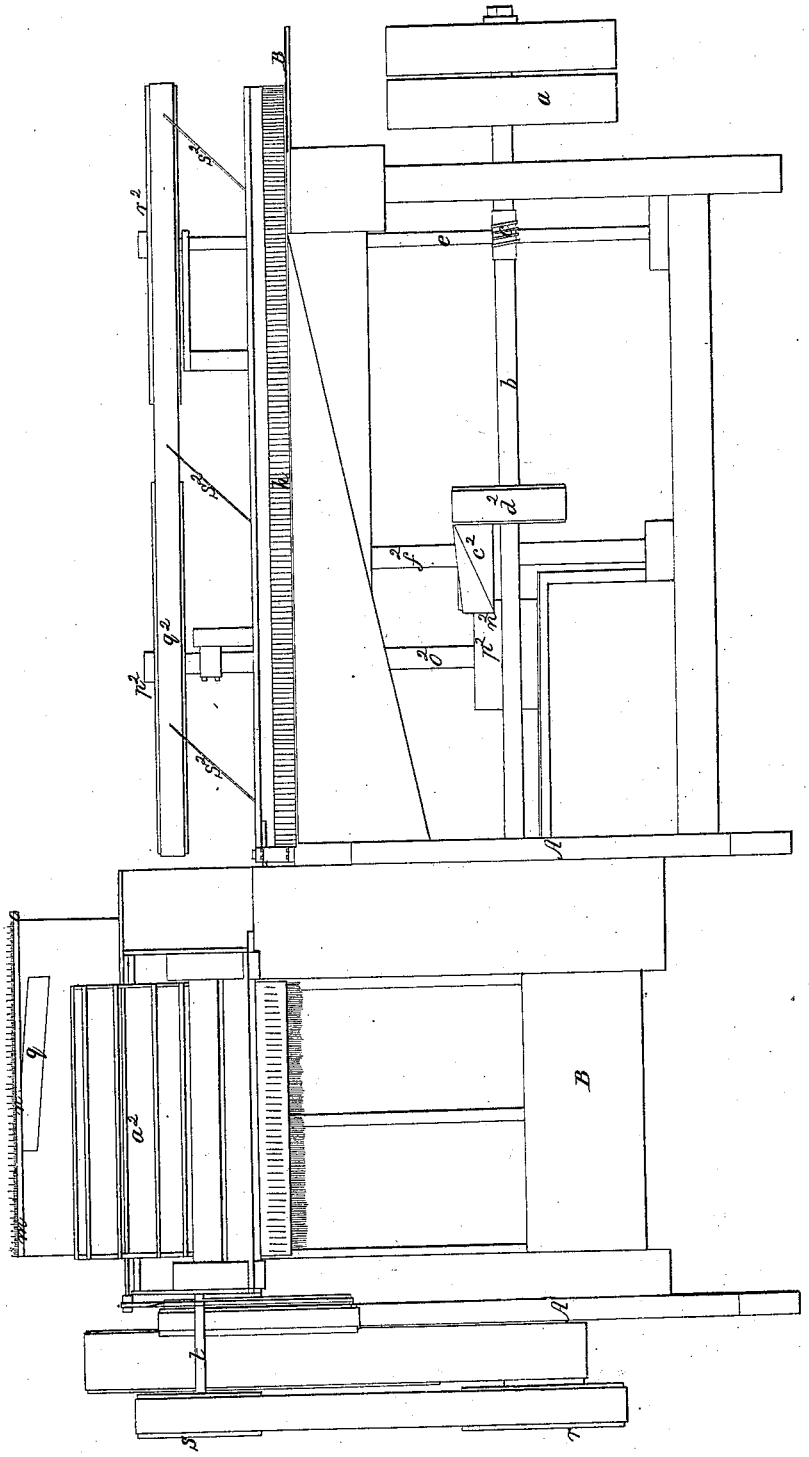

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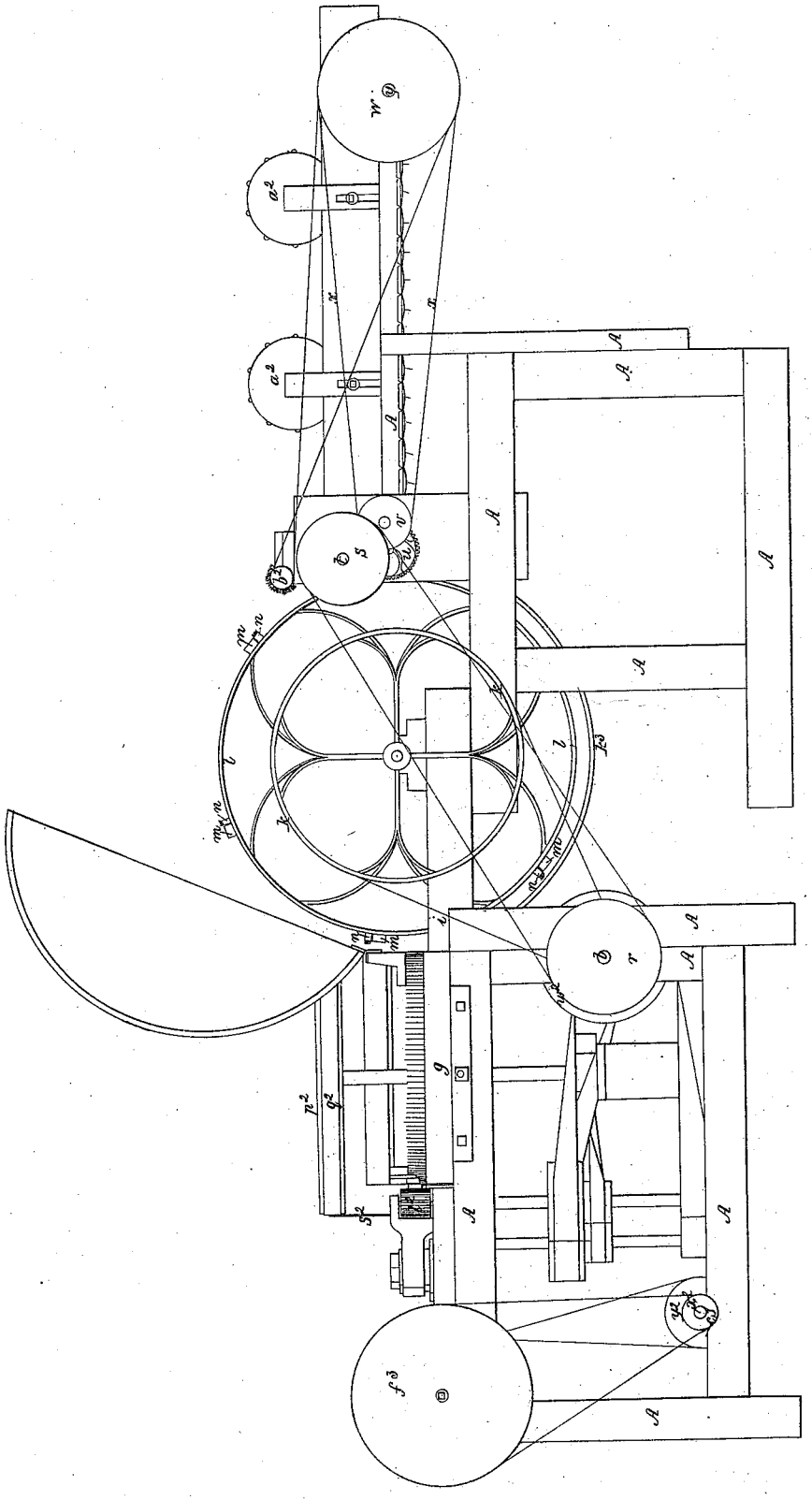

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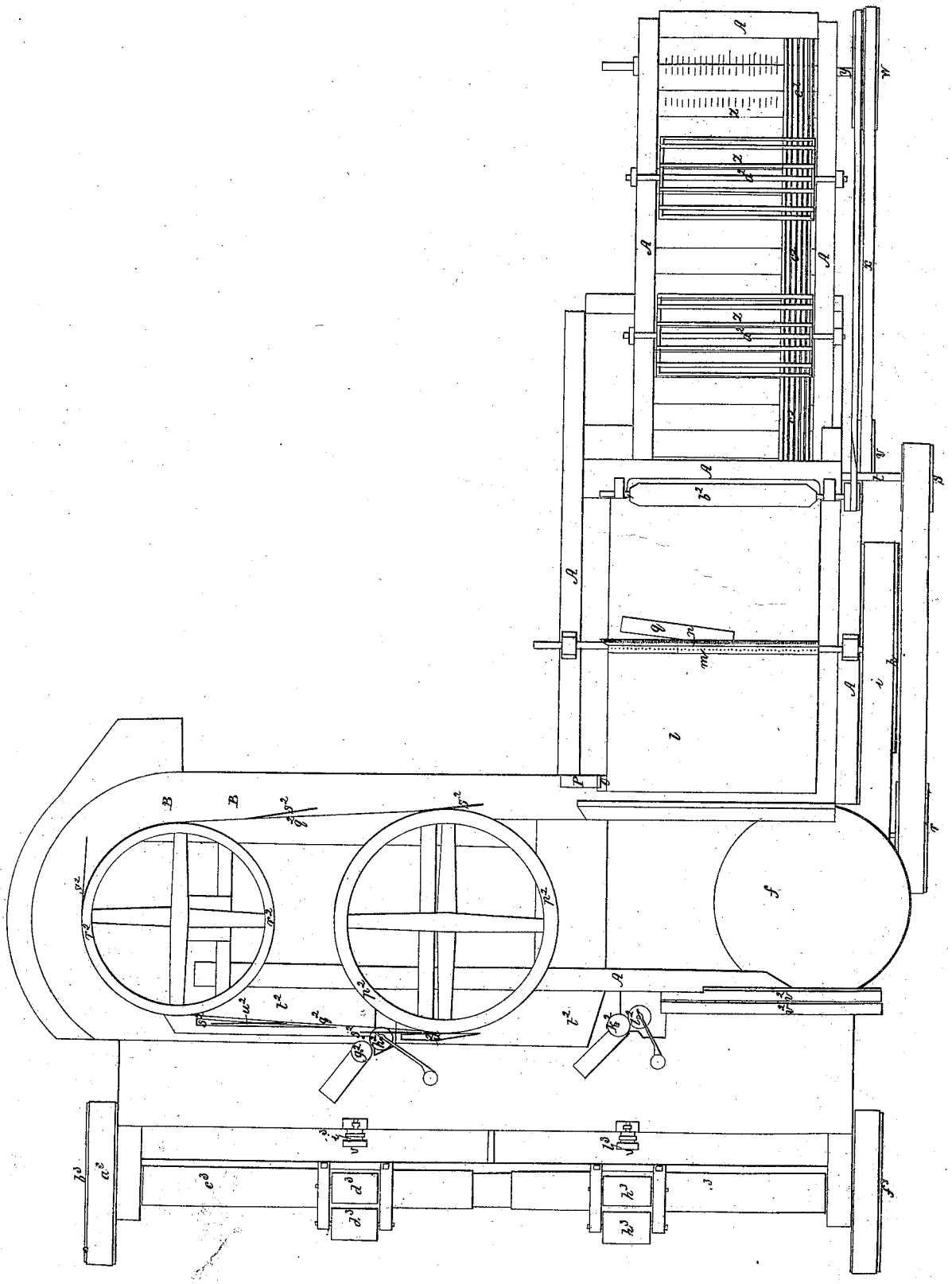
S. Couillard, Jr.,
Combing Machine.

4 Sheets. Sheet 4.

Patented Oct. 19, 1836.



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UNITED STATES PATENT OFFICE.

SAMUEL COUILLARD, JR., OF BOSTON, MASSACHUSETTS.

HEMP AND FLAX ROVING MACHINE.

Specification of Letters Patent No. 57, dated October 19, 1836.

To all whom it may concern:

Be it known that I, SAMUEL COUILLARD, Jr., of Boston, in the county of Suffolk and Commonwealth of Massachusetts, machinist, have invented, made, constructed, and applied to use a new and useful improvement in the art of combining and separating the fibers of flax, hemp, and Manila grass and forming the same into roving, which specify as follows—that is to say, for the explanation and understanding of my said invention and improvement reference is to be had to the drawings and plans hereto annexed, which are to be taken and considered as a part of this my specification.

Plate numbered one, is a front view of the machine, plate numbered two, is a back view of the same machine, plate numbered three, is a side view of the same machine, and plate numbered four, is a vertical view of the same machine. The plans are drawn on a scale of two inches to the foot, and are intended to indicate the different sizes, and proportions of the different parts of the machine which are deemed best for operating with it upon the fibers of ordinary length to the greatest advantage.

The roman letter A, in the several plates indicates those parts, which belong to the frame of the machine.

B, designates what is denominated by me the fringe table on which the fibers hanging from the teeth in the fringe belt hereinafter mentioned in the form of a fringe rest, while the wipers act upon them.

The letter *a*, on plates 1 and 2, respectively indicates the drawing pulley to the main shaft indicated by *b*, on plates 1, 2 and 3.

C, on plate 2, indicates an endless screw upon the main shaft which acts on the pinion *d*, Plate 1, which pinion moves horizontally with a vertical shaft, Plates 1, and 2, turning in boxes, and connected with a fixed pulley at its upper end, which pulley revolves horizontally with the shaft, and gives motion to an endless belt *z*, Plates 1, 2, and 3, which I denominate the fringe belt, which belt passes around another pulley *f*, Plate 4, at the opposite side of the frame of the same size with itself, and on the same level, and moving horizontally by the friction of the belt. In this belt pointed steel, or metallic teeth, steel is preferable, are set or fixed vertically of such size, and at such distances from each other as the quality of the fiber to be combed may in the discretion of the operator require. For flax the fibers of which are of ordinary length, I prefer that they should be about one-eighth of an inch in diameter at the lower end, and taper to a point in the form of a common tailor's needle, and be about one and a half inches above the edge of the belt *z*, and about one-fourth of an inch apart from each other; and for hemp, or Manila grass the said teeth should be about one-third larger, and about three-eighths of an inch from each other. The dimensions first above mentioned however will serve even for hemp and Manila grass, but larger teeth are deemed better in this case when the fibers are brittle. Different belts with teeth of different sizes to be changed one for the other according to the different kind of fibers to be operated upon may be used with advantage. This belt *z*, consists of two thicknesses of stout harness leather, between are inserted, and are held thereby the leather being glued together between them. This is deemed the most convenient, and best way of making the fringe belt with teeth, but the belt as it is obvious may be made of various other materials, and the teeth may be secured therein by various means which it is deemed unnecessary to describe.

Beyond the frame at the opposite end upon the main shaft near its end is fixed a pulley around which a belt *i*, plates 3, and 4, passes which gives motion to another pulley *k*, plates 3, and 4, fixed to the shaft of the large cylinder which I denominate the combining cylinder designated by *l*, in each plate, this cylinder *l*, moves vertically, and its upper surface moves down toward the revolving belt *z*, with teeth in it aforesaid when the machine is in operation, upon the cylinder are set steel, or metal straight teeth in rows in a right line with its shaft quite across the cylinder in pieces of wood introduced by *m*, in all the plates, extending across the cylinder, and attached to it; from, and above which pieces of wood the teeth project about one half of an inch upward, these teeth are to be about the same size as those in the revolving belt *z*, and about the same distance apart from each other having regard always to the length of the fibers to be operated upon as before mentioned. There should be about six of those rows of

upright teeth, being about a foot, and a half from each other upon a cylinder of three feet in diameter for flax, but the diameter of the cylinder may advantageously be larger, and the rows of upright teeth farther apart for longer fibers, although the above specified dimensions will answer for hemp, and Manila grass of ordinary length. And in all cases the diameter of the cylinder, and distance of these teeth from each other should be adapted to the length of the fiber to be operated upon, and the roving to be produced. For combining flax or hemp for fine thread these teeth should be fixed gradually nearer together from the outer end of the cylinder *l*, where they should be farthest apart to the inner end where they should be nearest together, so as to have them about three eighths of an inch at one end, and one eighth of an inch at the other, in order that the fibers after they are lodged upon the revolving belt *z*, as they pass along by the cylinder *l*, may be first combed by the teeth on the cylinder which are farthest apart, and that the teeth nearer together may act upon the fibers on said belt upon which the coarser teeth have already acted. By this means the longer fibers are more easily separated from the shorter fibers, and the fibers connected together are more effectually split, and separated from each other, and made more even, and equal in size. But in combining hemp, and other like fibraceous substances for rope yarn, and such like purposes it is better to have these teeth farther apart from each other so that the fibers may not be so much cut up or broken. These teeth may be fixed in the cylinder *l*, instead of being fixed in such pieces of wood to be attached to the cylinder, but it is more convenient to have them fixed in such pieces of wood in order that they may whenever occasion may require it, be removed with the pieces of wood from the cylinder, with pleasure, and other teeth nearer together, or farther apart be placed in their stead according to the length, and kind of fiber to be operated upon, and the kind of roving intended to be made. *n*, plates 2, 3, 4, indicates a wire brush, or small wire teeth fixed on leather, and attached to a piece of wood extending across the cylinder *l*, close to the pieces of wood upon which the straight, and upright teeth aforesaid are fixed, the inner end of these pieces of wood, on which the brushes are, projects about two inches beyond the cylinder *l*, so as in its revolution to come in contact with, and be operated upon by a comb. The teeth of these brushes are about the same size as ordinary card teeth, and are fixed in the leather in the same way, but the teeth are bent to an angle of forty five degrees opposite to the directions of the motion of the cylinder *l*. The number of these brushes on pieces of wood is equal to the number of rows of upright large teeth near which they are respectively placed. The surfaces, or tops of these brushes are, excepting when acted upon, and moved up by the comb as hereinafter mentioned on a level with the top of the pieces of wood in which the rows of the upright teeth are placed. The pieces of wood to which these brushes are attached have slots made diagonally one near each end through which pass screws, or pins with heads fixed in the other pieces of wood in which are the upright teeth so that when the projecting ends *o*, plates 1, 2, 4, pass by the stationary comb, *p*, plates 1, 4, each brush is when acted upon by this comb thereby raised a little above the top of the upright teeth aforesaid, and so remains until it passes down by, and near to the points of the teeth on the endless belt *z*, when having passed the comb it returns to its former position being drawn down by means of a spring *q*, plates 2, 4. The points of the upright teeth, and surface of the cards pass as near as may be and not touch to the teeth on the revolving fringe belt *z*, so as to lodge the fibers upon its teeth, and comb them when lodged there. Those which are not lodged at first pass around the cylinder, and are lodged afterward. Underneath the combing cylinder is a curved piece of metal, or wood k^3, plate 3, forming the same curve described by the points of the fixed teeth in revolving, and being as near as may be, but not quite in contact with them of the width of the frame, and covering nearly the lower half of the cylinder for preventing the fibers from falling out of the teeth when they come underneath by the revolution of the cylinder.

The pulley indicated by *v*, on all the plates fixed on the outer end of the main shaft *b*, by means of a belt passing over it, and the pulley *s*, on all the plates fixed upon the end of the shaft *t*, plates 2, 3, 4 of a metallic fluted draw roller gives motion to that roller which turns in boxes fixed in parts of the frame. Immediately above the fluted roller is another roller covered with leather so adjusted to the fluted roller as to press closely upon, and be turned by it when it revolves. Inside of the pulley *s*, upon the shaft *t*, is fixed a small pinion which acts upon a wheel *u*, Plate 3, upon the inside of which is another pinion acting upon a pinion fixed to the pulley *v*, Plates 3 and 4, from which a belt *x*, passes over the pulley *w*, Plates 3 and 4. This gearing is only used when it is required to produce a slow motion in the pulley *w*, and in ordinary cases a belt passing from the shaft *t*, to the pulley *w*, is substituted for it in order to give motion to the pulley *w*. The pulley *w*, is fixed upon the shaft *y*, Plates 3, and 4, of a cylindrical roller inside the

frame over which passes a feeding belt of leather indicated by z, Plate 4, which also passes over another cylinder roller of the same size, and on the same level inside of the frame, turned by the friction of the feeding belt operated upon by the motion of the other roller, and near to the fluted rollers above mentioned. Across this belt about two inches apart there should be rows of teeth of about the same size as those in the endless fringe belt z, and about half an inch from each other. The teeth may be fixed in this belt, or which is better in pieces of wood attached to it, so that they may be changed for others larger, or smaller, and further apart, or nearer together so as to be adapted to the kind of fibers to be operated upon. The cylinders over which this endless feeding belt z, passes are so placed that the feeding belt in revolving brings the center of the teeth between the points, and the bottoms thereof successively level with the upper surface of the fluted draw roller, and so that these teeth may just pass by the same fluted roller as near as may be, and not touch it. The points of these teeth should be bent on a curve a little backward from the draw rollers. The upper surface of the feeding belt when the machine is in motion is moved by the action of the belt on the pulley w, toward the fluted draw roller. Rod cylinders as I denominate them indicated by a^2, Plates 2, 3, and 4, fixed to shafts, and revolving in boxes in the frame, are so placed above the feeding belt, and adjusted as to be moved by the teeth set in rows as aforesaid across the belt by means of the rows of teeth successively meshing in between the rods, while the belt is revolving; these rod cylinders serve to keep the fibrous substance to be operated upon from rising out of the teeth too soon while drawn by the teeth toward the draw rollers. Large wires, or rods on one side of the revolving feeding belt are laid between the teeth, and are fixed at one end on the frame, and at the other on the fluted draw roller for the purpose of conducting the ends of the fibers gradually up as on an inclined plane from the teeth to the draw rollers. A brush b^2, Plates 3, and 4, is moved by a belt from a groove on the inside of the pulley w, to keep the covered upper draw roller from being clogged by the fibrous substance. A pulley d^2, Plates 1 and 2, is fixed on the main shaft b, next to the endless screw over which a belt passes to, and over, and gives motion to a pulley c^2, Plates 1 and 2, upon a perpendicular shaft f^2, Plate 2, on the upper end of which is the first draw roller z^2, Plate 4, against which the draw roller h^2, Plate 4, is pressed by a spring over a pulley on the main shaft next that last mentioned passes a belt, which also passes over, and gives motion to the pulley i^2, fixed on the perpendicular shaft of the second draw roller k^2, Plate 4, which has a like roller v^2, Plates 3, 4, pressed against by a spring. On the shaft of the second draw roller below the pulley before mentioned is fixed another pulley m^2, Plate 1, over which passes a belt to, and over, and gives motion to a pulley n^2, fixed on a perpendicular shaft o^2 Plate 1, which shaft passes up to a pulley p^2, Plates 1, 2, and 4, fixed upon it. A belt q, Plates 1, 2, and 4, passes around, and is moved by this pulley, and passes around, and gives motion to another pulley r^2, Plates 1, 2, and 4, somewhat smaller than that last mentioned, and of the same size with the pulleys around which the teethed fringed belt z, passes. On this belt q^2, are fixed steel, or metallic wires s^2, Plates 1, 2, 3, and 4, (steel being preferred) for the purpose of bringing the fibers into such position, while passing along the fringe table lodged in the teeth of the fringe belt z, as to direct the ends of them forward toward the draw rollers, that they may be seized, and drawn out by these rollers.

A plate of iron is put upon the frame above the place where the fibrous substance is made to pass when it approaches near to the draw rollers having slots w^2, w^2, Plate 4, through which the wipers pass for the purpose of directing the ends of the fibers just before coming to the rollers, and so made, and adjusted as that the wipers may be raised by, and pass over the metallic plate, and be thereby prevented from acting upon the fibers just at the time when the fibers come to the draw rollers so as to prevent their crushing the fibers from the draw rollers. Inclined planes of thin smooth metal v^2, Plates 1, and 4, one on each side of the teeth, beginning at the base of the teeth therein near the last draw roller, and inclining upward in the direction of the motion of the belt until they rise above the teeth in the toothed revolving fringe belt, and fixed so as to take off the short fibers, or tow not taken off by the draw rollers, and remaining on these teeth. On the main shaft is another pulley w^2, Plates 1, and 3, next to the frame on the inside over which a belt passes to give motion to the shaft x^2, Plates 1, and 3, by means of a pulley y^2, Plates 1, and 3. Upon the opposite end of this shaft beyond the frame is a pulley z^2, Plate 1. Upon this shaft over which a belt a^3, Plates 1, and 4, passes to, and over, and gives motion to the pulleys b^3, Plates 1, and 4, to give motion to the leading roller c^3, Plates 1, and 4, to draw, and bring the roving through the revolving tubes. Two rollers d^3, Plates 1, and 4, are adjusted to bear upon this leading roller, and to revolve by its friction for the purpose of drawing and leading the roving through, and from the revolving tubes into the can. On the oppo-

site end of the shaft x^2, is a pulley e^3, Plates 1 and 3, over which a belt passes to give motion to the pulley f^3, Plates 1, 3, and 4, which gives motion to a like leading roller g^3, Plates 1, and 4, which has two rollers h^3, Plates 1 and 4, for a like purpose of drawing, leading, and conducting the second roving into the can. i^3, i^3, are revolving tubes with hooks for the purpose of condensing the roving into a more compact form, which revolving tubes are moved by belts over the pulleys k^3, i^3, Plate 1, on the shaft x^2.

When the machine is put in motion, and adapted to the particular fibrous substance to be operated upon, the fibrous substance may either be laid on the feeding belt by hand, or may be more conveniently formed into a bat, and wound upon a reel, and fed from that upon the leather belt upon the wires, or rods c^2, occupying about one third of its width in ordinary cases. The width of the belt is calculated for receiving the fibrous substance on the whole width of it, when it is intended to make coarse threads for bag yarn, and similar sizes, in which case the rods must be laid as aforesaid over the whole width of the belt. The fibrous substance when fed upon the belt, while the machine is in motion first comes in contact with the teeth in the feeding belt, and these fibers are carried along under the rod cylinders moved by the teeth which serve to keep them down as aforesaid, and thence they are carried along the rods, and up between the draw rollers which serve to draw them from the teeth in the pieces of wood on the feeding belt in a thinner form, and conduct them to the combing cylinder l, by which they are received, and carried along in the fixed teeth on said cylinder which in revolving carries them down and from time to time lodges them on the teeth of the revolving fringe belt z, after they have been raised by the card teeth in manner aforesaid to the bevel of the points of the fixed teeth on the said cylinder l, and when the fibers are on the teeth of the fringe belt they are combed as aforesaid as they pass along by the cylinder v. Having passed by the cylinder they are carried along, hooked on the teeth of the revolving belt z, hanging down, and appearing like a fringe, and are wiped by the wipers s^2, on the revolving belt 9^2, so as to present the ends of the fibers foremost, and bring them within the reach of the draw rollers for drawing out the roving z^2, h^2, k^2, l^2, the wipers being raised from the fringe table successively by the metallic plate under which the fibers pass just before the wipers reach the draw rollers so that the wipers may not brush away the fibers from the draw rollers. The draw rollers are placed at different distances from the revolving fringe belt z. The first being farthest, and the other or others if it be thought proper to have more than two sets of draw rollers being placed successively nearer to said belt, so that the longest fibers may be taken into the first draw rollers farthest from said belt, and the shorter remaining fibers which do not reach the first drawer rollers, into the next draw rollers, and the still shorter fibers which do not reach the latter, into the next draw rollers, if more than two sets are used. Each set of draw rollers takes all the fibers which reach them. As many sets of draw rollers may be used for this purpose as occasion may require. From the draw rollers z^2, h^2, k^2, l^2 the fibers are conducted through the revolving i^3, i^3, into the cans. The short fibers, and those entangled are carried to the inclined metallic planes, and thereby taken from the teeth on the belt which are thus cleared, and pass around the cylinder l, to receive more fibers therefrom to be combed, and brought around in manner aforesaid to the draw rollers to be formed into roving. It will be well to have each set of draw rollers after the first set, successively smaller than the first set, or if of the same size to have them revolve slower as they are respectively nearer to the fringe belt, in order to make the roving as near as may be of the same size.

What I claim as my new improvement is—

1. The combing cylinder above described in connection with the revolving toothed fringed belt aforesaid for the purposes herein before mentioned.

2. The inclined planes on both the sides of revolving toothed fringe belt in connection, and combination with said fringe belt for the purpose aforesaid.

In testimony that the above is a true specification of my said invention, and improvement, I have hereto set my hand this eleventh day of April, in the year of our Lord, eighteen hundred, and thirty-six.

SAMUEL COUILLARD, Jr.

Witnesses:
A. H. Fiske,
John W. Parker.