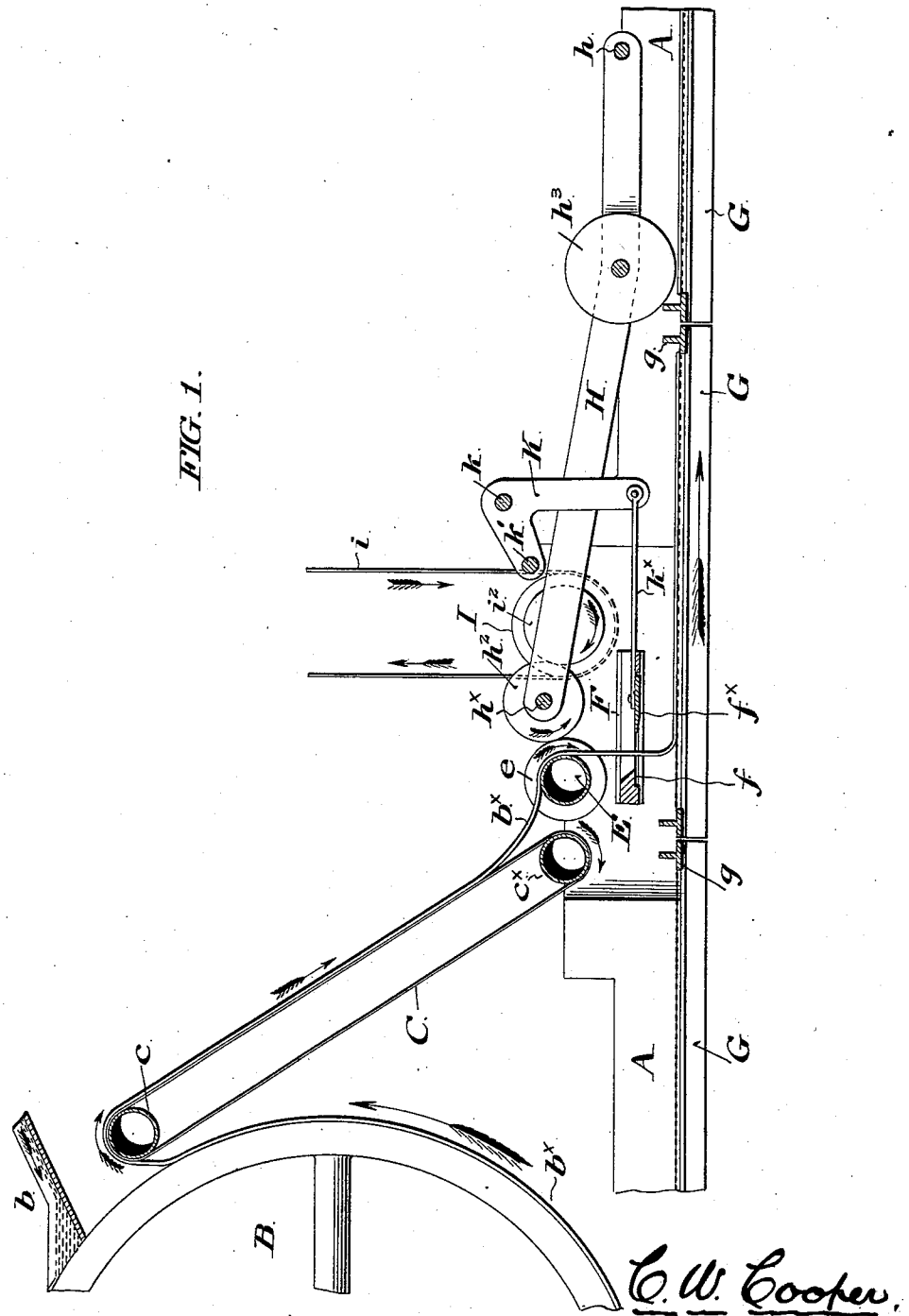
(No Model.) 5 Sheets—Sheet 1.

C. W. COOPER.

APPARATUS FOR MAKING GLUE.

No. 521,947. Patented June 26, 1894.

FIG. 1.



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(No Model.) 5 Sheets—Sheet 2.

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FIG. 3.

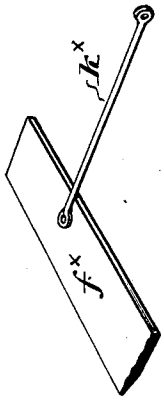

FIG. 2.

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(No Model.) 5 Sheets—Sheet 3.

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APPARATUS FOR MAKING GLUE.

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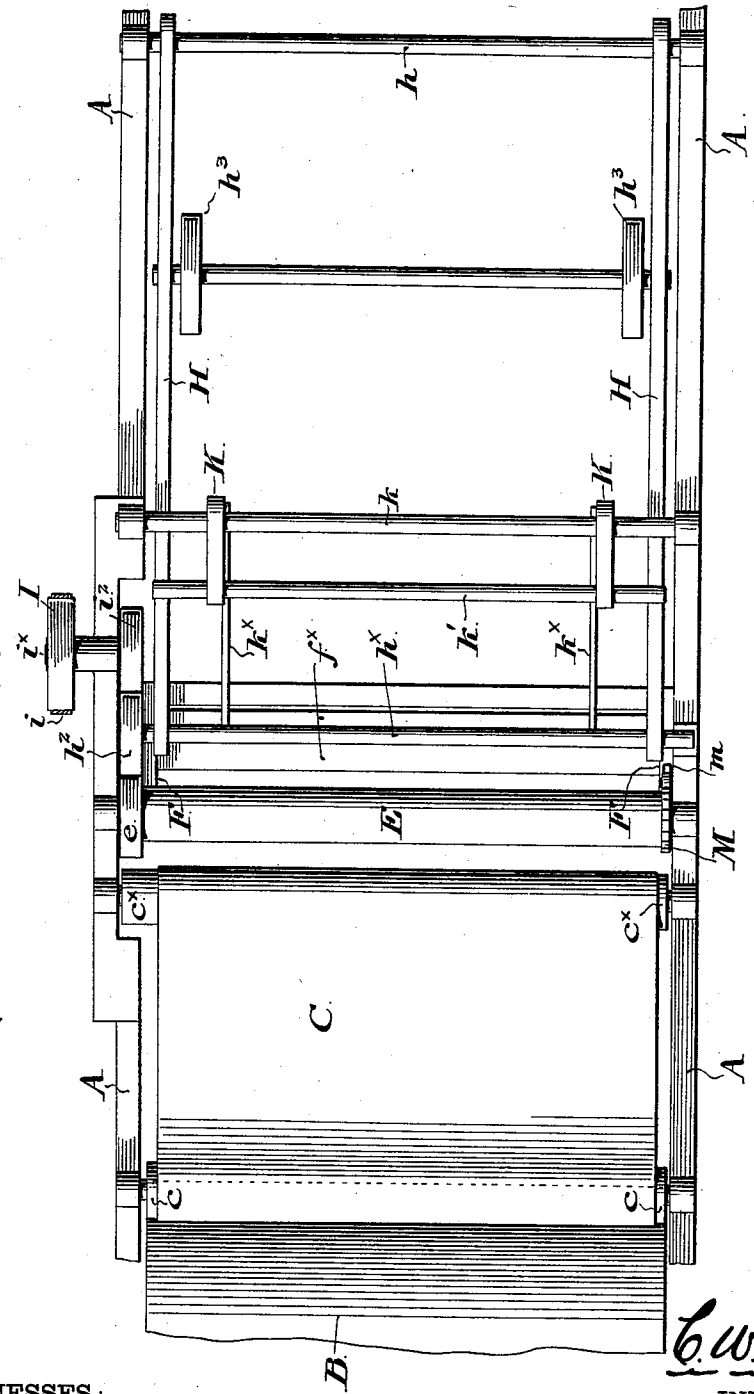
FIG. 4.



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(No Model.) 5 Sheets—Sheet 4.

C. W. COOPER.

APPARATUS FOR MAKING GLUE.

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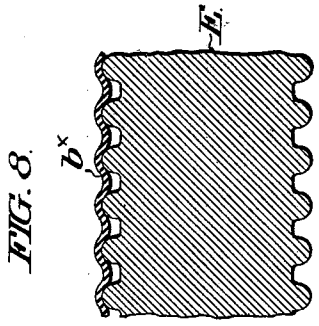

FIG. 8.

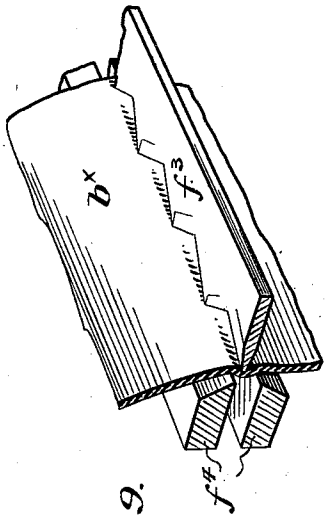

FIG. 9.

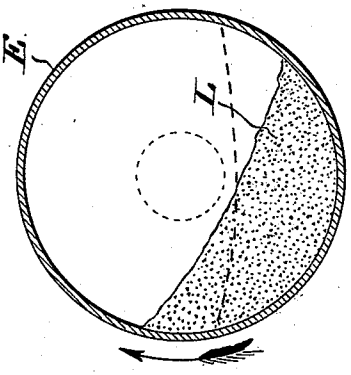

FIG. 5.

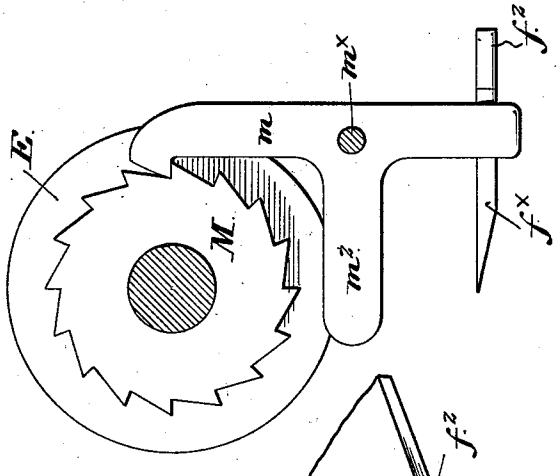

FIG. 6.

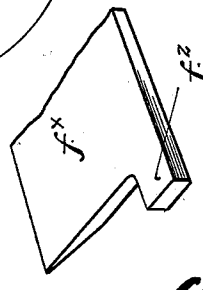

FIG. 7.

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APPARATUS FOR MAKING GLUE.

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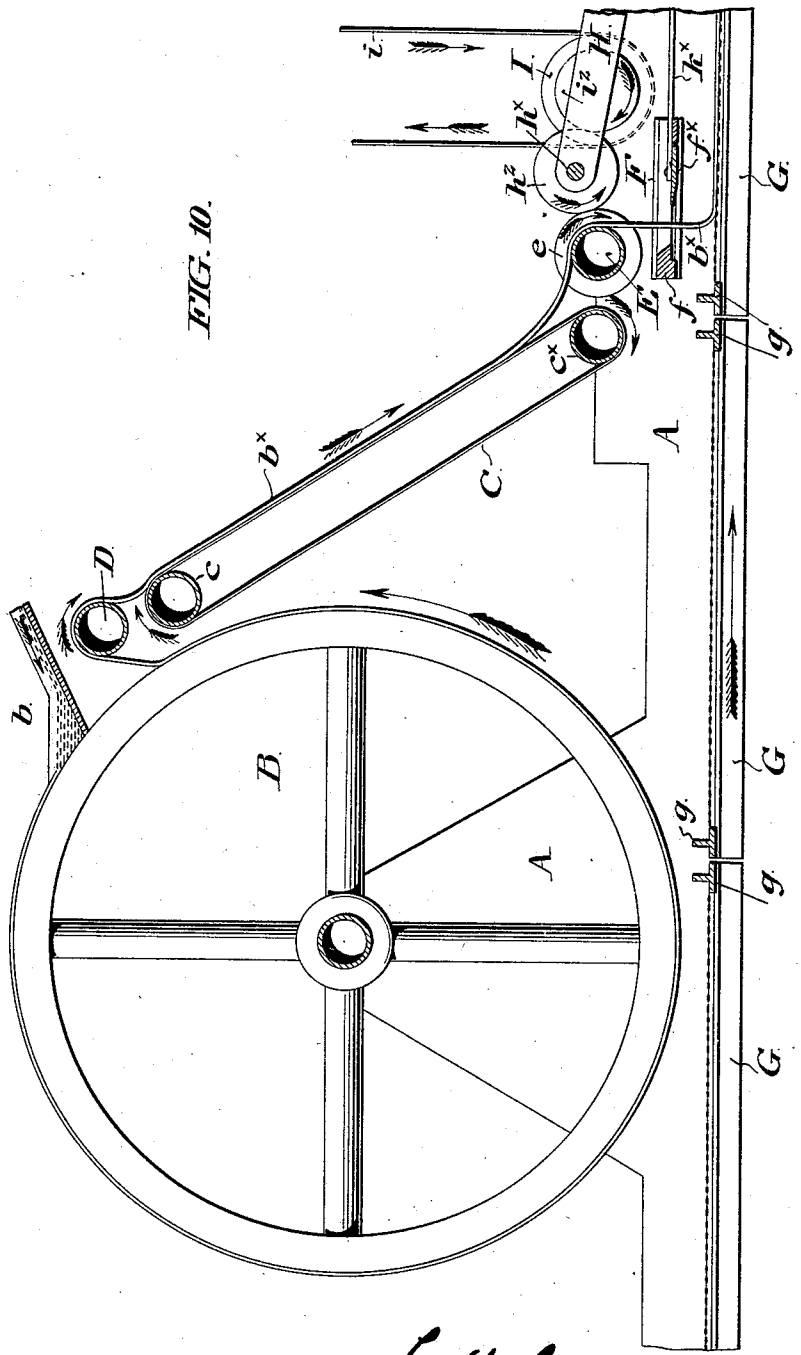
FIG. 10.



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UNITED STATES PATENT OFFICE.

CHARLES W. COOPER, OF NEW YORK, N. Y.

APPARATUS FOR MAKING GLUE.

SPECIFICATION forming part of Letters Patent No. 521,947, dated June 26, 1894.

Application filed April 16, 1894. Serial No. 507,695. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. COOPER, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in the Manufacture of Glue, of which the following is a specification.

My invention relates in general to operations connected with the formation of glue into sheets of jelly, in which liquid glue fed upon the surface of a cooling cylinder is congealed thereupon into a sheet which is then stripped from the cylinder and cut or divided into sections which are successively deposited upon carrying nets which are caused to travel beneath the cooling cylinder and the sheet-delivering and sheet-dividing mechanisms off to a drying room wherein the glue is dried upon the nets.

My invention relates particularly to means for delivering or stripping the sheet of jelly from the cooling cylinder, for dividing it into sections and for delivering or depositing the sections upon the carrying nets.

In these particulars the invention embodies improvements upon certain apparatus invented by me and described and claimed in two pending applications for patents, one of which was filed by me June 15, 1891, as Serial No. 396,291, and the other of which was filed by me February 15, 1894, as Serial No. 500,245. In the first of the foregoing applications, the stripping of the sheet from the cooling cylinder was effected by the aid of an endless sheet-delivering apron upon the bight of which around one of its carrying rollers the sheet was first bent, and the surface of which apron was caused to travel at a speed superior to that of the periphery of the cooling cylinder. In the second of the foregoing applications, sheet-cutting mechanism was combined with conveyer-ways for transporting glue-carrying nets in such manner as to be operated by the passage of the nets in their transit;—while, in order to secure the accurate deposit of each section of the divided sheet upon the particular net to which it was designed to be applied, means was provided for securing the intermittent acceleration and retardation of the speed of travel of the nets.

It is the object of my present invention to provide improved means for stripping the sheet from the cooling cylinder,—so as to permit of its passage or delivery to the cutting mechanism, and also improved means for insuring the accurate division and deposit of the cut sections upon the traveling nets, without liability of the accidental engagement of a cut section with, and its consequent sticking to, any part of the cutting mechanism, and without liability of its misplacement or improper deposit upon the net, as, for instance, its deposit upon the end of a net frame, all without resort to any intermittent alteration of the speed of the travel of the nets, and while the nets in series, and preferably in contact with each other, are traveling at a uniform and continuous speed.

Machinery embodying my improvements is represented in the accompanying drawings, and hereinafter described, the particular subject-matter claimed as novel being specifically set forth in the claims.

In the drawings, Figure 1 is a side elevational view of apparatus embodying my improvements, and especially such as relate to the feeding and cutting of the sheet and to the deposit of the cut sections upon the carrying nets,—the parts being represented in the position which they occupy before the action of the cutting mechanism and during the feeding forward of the sheet. Fig. 2 is a similar view of the same parts in the position which they occupy during the action of the cutting mechanism. Fig. 3 is a fragmentary perspective detail of a portion of the movable blade of the cutting mechanism. Fig. 4 is a top plan view of the parts represented in Figs. 1 and 2. Fig. 5 is a transverse sectional elevation of a loaded take-up roller such as I find it convenient to employ. Fig. 6 is an end elevational detail of a ratchet and pawl connection adapted to be applied to said loaded roller. Fig. 7 is a fragmentary perspective view of a portion of the movable blade of the cutting mechanism illustrating a lug by the stroke of which the pawl is disengaged from the ratchet wheel. Fig. 8 is a central, vertical, longitudinal, sectional, elevation of a portion of a modified form of take-up roller which I find it convenient to employ. Fig. 9 is a fragmentary perspective view of a modified form of cutting mechanism. Fig. 10 is a side elevational view similar to Fig. 1, representing the application

of a sheet-stripping roller operative in connection with the cooling cylinder.

Similar letters of reference indicate corresponding parts.

Before describing the devices in which my improvements are embodied, it is proper to explain that I have not deemed it necessary to illustrate the means by which the cooling cylinder employed is revolved or the means by which its surface is kept cold,—or to illustrate any particular form of conveyer-ways along which the nets and net frames are caused to travel,—or any specific means for occasioning the continuous and uniform travel of the nets and their frames,—or any particular means for occasioning the operation of the stripping roller, or of the sheet-delivering apron when employed,—for the reason that the most important of these instrumentalities are disclosed in my pending applications, while various others of them are mere workshop expedients within the knowledge of any skilled constructor.

In the drawings, A represents a portion of a frame-work of any preferred character, for the apparatus as an entirety.

B is a cooling cylinder revoluble with reference to the frame-work by any preferred means.

b is a feeding chute for supplying liquid glue to the surface of the cylinder.

C is an endless sheet-delivering apron conveniently disposed at the inclination shown, and traveling with respect to an upper roller *c* and a lower roller $c^{\times}$, either of which may be driven. This roller is not essential but may be dispensed with and the sheet conducted directly from the stripping roller to the cutting mechanism or take-up roller hereinafter referred to.

$b^{\times}$ is the sheet of jellied glue.

In the construction represented in Figs. 1, 2, and 4, which particularly illustrate the sheet-cutting and apron-delivering mechanisms, the sheet of glue is represented as conducted from the surface of the cooling cylinder immediately to the carrying breast of, and over the upper roller *c* for, the delivering apron, in the manner set forth in my pending applications referred to. In Fig. 10 the sheet is represented as conducted from the cooling cylinder over and in bite around the surface of a stripping roller D which is caused to travel under the actuation of any preferred motive power at a surface speed superior to that of the cooling cylinder. This stripping roller performs the office performed, in the constructions of my pending applications, and in the constructions shown in Figs. 1, 2, and 4, by the upper carrying roller of the sheet-delivering apron itself, and, when employed in connection with an apron as represented, delivers the stripped sheet to the carrying surface of said apron without necessitating its being bent about the upper roller of said apron. The speed of this stripping roller may, of course, be adjusted at will, and the stretch given to the sheet in its passage over the said roller will be immediately relaxed as the sheet leaves said roller, and as it is received upon the apron, or other equivalent sheet-delivering and carrying-off surface, when employed, operating in conjunction with said stripping roller and running at a surface speed preferably equal to that of the surface of the cooling cylinder.

Referring now to the mechanism for dividing the sheet transversely into sections,—in the apparatus of my pending application filed February 15, 1894, the sheet of jelly is caused to have a continuous forward movement without any intermission except such as is occasioned by the action of the cutting blade, to which a temporary interruption of the forward movement is due. During this momentary interval, however, it might occur that the advance end of the cut sheet would become folded together, and descend upon the carrying net in a doubled-up condition, with the result that when the sheet is a sticky one, it would be liable to stick to the plate or to its guiding and retaining frame in interference with the further regular advance and descent of the sheet. To obviate this disadvantageous possibility I provide, in my present invention, for the arrest of the movement of the advance end portion of the sheet toward the cutting mechanism during the period of the operation of said mechanism, without, however, interfering with the continuous stripping of the sheet from the surface of the cooling cylinder or its continuous delivery therefrom,—and further provide that, so soon as the cut is made, the operation of feeding forward of the advance end portion of the sheet to the cutting mechanism and the continuing passage of said sheet through said cutting mechanism until the time for the next cut arrives, shall be resumed. The mechanism which I thus provide for the purposes stated, is conveniently constituted by a roller which I term the take-up roller, located between the sheet-stripping mechanism and the cutting mechanism, over which the sheet is conducted, and from which, as it (said roller) is caused to revolve, the advance end of the sheet is caused to descend between the cutters, and which, when caused to come to rest or to cease to revolve, arrests the further descent of the sheet during the period when the cutting mechanism is making its cut or dividing the sheet. This roller is so situated with respect to the stripping roller, or to the delivering end of the apron when employed that during the period when the roller is at rest the surplus length of the sheet of jelly as continuously delivered is caused to sag in the space between said stripping roller and said take-up roller. When the said roller is caused to resume its revolution, its peripheral speed is caused to be such as to take up the slack or surplus length of the sheet represented by a given sag by the time when the next cut or division of the sheet is made.

A convenient organization of the device referred to is the following:—E is what I have termed the take-up roller, the same being a preferably horizontally disposed and suitably mounted roller, disposed in the organization represented in parallelism with and slightly in advance of the lower roller $c^{\times}$ of the sheet-delivering apron, its relative disposition with respect to which is such that the sheet of jellied glue may be conducted directly from the breast of the apron to its own surface, as represented in Figs. 1 and 10. In this position the sheet is comparatively taut, but, as will be apparent from inspection of the drawings, there is room for the sheet to sag between the aforesaid rollers, as indicated in Fig. 2,—or between the stripping roller and the take-up roller when the apron is not used.

While for the better qualities of glue there would be no disadvantage in forming the surface of the take-up roller as a smooth-faced cylinder, yet with sheets formed from poor glue which is sticky and has some adhesion I find it convenient, in order to prevent the possibility of the pendent advance end of the sheet being carried backwardly by and beneath the take-off roller away from the cutting mechanism when the sheet has not sufficient pendent length to give it weight to pull it off the roller,—to form said roller with circumferential grooves, as shown for instance in Fig. 8, which serve to reduce the surface of contact between the sheet and roller and the consequent adhesion of the sheet to the roller. Of course, in this construction a less pendent length of sheet possesses weight sufficient to strip it from the roller. It may be proper to say that the objection to a considerable pendent length of sheet between the take-up roller and the cutting mechanism is that the greater the length of sheet the greater must be the space between the cutting blades to insure that the sheet shall not swing against either, and consequently the throw of the blade must be disadvantageously long.

The take-up roller is so disposed that the advance end of the sheet led from it depends and is free to descend between the fixed blade f and the movable blade $f^{\times}$ of the cutting mechanism, upon the carrying net which for the time being happens to be beneath said mechanism.

The cutting mechanism itself may be of any preferred character that represented in Figs. 1, 2, 3, 4, and 10, in which a fixed shears frame F retains both the fixed and movable blades f and $f^{\times}$ is convenient. The movable blade $f^{\times}$ represented in the foregoing figures, is shown as provided with a straight cutting edge operating in conjunction with the fixed straight cutting edge f. I find it of advantage, however, to form the movable blade with a serrated edge of very sharp teeth, such for instance, as is shown by f^3 in Fig. 9, and to cause said blade to operate in conjunction with two fixed blades between which it enters, and which are disposed respectively above and below it. By resort to this construction in which the teeth of the cutting blade penetrate the glue gradually, the cut is much more easily made than with a straight edged blade, moving, after the manner of a pair of shears, against a fixed straight edge with which it must necessarily make very close contact.

The traveling nets G, under which term are included both the net or web proper and the net frame, are conveniently of a construction set forth in my pending application, filed February 15, 1894, in which transverse end bars constituted by inverted T-bars, g, constitute the end members of the frame. These nets are, as mentioned, caused to travel by any preferred means in an uninterrupted series along any preferred form of conveyer-ways,—the direction of movement being that represented by the arrow applied to them in the drawings.

H are a pair of parallel roller-carrying levers, conveniently arranged one at each side of the frame-work, and pivoted at their distant ends upon a fixed pivot bar h extending transversely of the frame-work and secured thereto. At their advance or inner extremities these levers are conveniently provided with an axial rod $h^{\times}$ upon which is secured an idler friction roll h^2 located in the same vertical plane with a friction roll e applied to and connected with the take-up roller E.

I is a driving pulley or other motive disk, adapted to be continuously revolved in the direction of the arrow applied to it under the influence of the driving belt i. Upon the shaft $i^{\times}$ of this driving pulley, which is conveniently journaled in the frame-work, is secured a driving friction roll i^2, disposed in the same vertical plane as the friction roll h^2 and the friction roll e.

The relative disposition of the three friction rollers above referred to (and they may be toothed rollers) is such that,—the driving friction roll i^2 being assumed in continuous revolution,—the roller friction roll e will be continuously driven in the direction of the arrow applied to it whenever the idler friction roll h^2 which the carrying levers carry is brought into range to be engaged with its periphery and at the same time with that of the driving friction roll i^2. This engagement, represented in Fig. 1, is, by reason of the normal relationship of the parts as represented in said figure, constant, except when the said idler friction roll is lifted by the lift of the carrying levers out of contact with the other rolls, and into, for instance, the position represented in Fig. 2.

The lift of the carrying levers is intermittently occasioned by the contact of the end bars of the traveling nets in the travel of said nets, with the carrying levers preferably by means of lifting rollers h^3 applied to said levers at a point intermediate of their length.

Obviously, the lift of the carrying levers and the consequent disengagement of the idler

friction roll h^2 with the rolls e and i^2, will occur during the period of the contact of the contiguous end bars of successive net frames with the lifting rollers of the carrying levers, as indicated in Fig. 2. Obviously, also, when said end frame bars have, in the continuing travel of the nets, passed beyond said rollers, the carrying levers will drop and the idler friction roll make its two-fold contact with the driving friction roll i^2 and the roller friction roll e, as shown in Figs. 1 and 10. During the period of this contact the take-up roller E will be revolving. During the period of the lift of the idler friction roll the take-up roller will be at rest.

The parts are so proportioned that the period of the dwell of the take-up roller corresponds with the period of the action of the cutting mechanism, and is accompanied by the cessation of the forward or downward movement of the depending advance end of the sheet of jelly.

The cutting mechanism itself is conveniently associated with the above described mechanism for occasioning the rotation and the rest of the take-up roller.

A means for conveniently operating the cutting mechanism is the following:—K are a pair of parallel bell-crank levers, fulcrumed upon a transverse fulcrum bar k housed in the frame-work in parallelism with the take-up roller. The depending lower ends of these crank levers are connected by links $k^\times$ to the movable blade of the cutting mechanism. The horizontal ends of said levers are connected by a transversely-extending rod, which I term the lifting rod k', and which overhangs the roller-carrying levers and is adapted to be encountered by said levers in their elevation and to be lifted with them, with the result of causing the inward deflection of the depending arms of the crank levers and the forward throw of the link and cutter blade.

Such being a description of a convenient means for effecting the intermittent operation of the take-up roller and of the cutting mechanism,—and it is to be understood that other devices mechanically different but operative to the same result, may, without departure from the invention, be substituted for the special devices described and shown,—it is proper to add that in order to insure the take-up of the sagged portion of the sheet, the total travel of the periphery of the take-up roller must be slightly in excess of that of the periphery of the cooling cylinder, the travel of which measures the length of sheet, which, not counting stretch, must be taken up by the take-up roller. This excess of travel of the take-up roller over the natural length of sheet passing over it, will merely stretch the sheet slightly at times and not interfere in any way with the operations described.

During the period of the rest or dwell of the take-up roller and of the arrest of the descent of the sheet before the cut is made, the forward movement of the carrying net then beneath the cutting mechanism will cause the rear portion of the section deposited upon it to be slightly lifted from it, as shown by dotted lines in Fig. 2, so that when the section is cut from the sheet, its rear end portion will fall upon the net, and the front end of the succeeding section will descend until it reaches the level of the succeeding net, by which time the front end bar of said succeeding net will have passed under and beyond the advance end of the descending sheet which in consequence will not lap over said end bar. Proper adjustments of speeds and distances will therefore insure the proper descent and deposit of the succeeding sections of the sheet upon the webs of the succeeding carrying nets, without their overlapping the end frame-bars.

The provision of the devices described affords relief from the risk of an improper deposit of the divided sections upon the sheets or the engagement of the advance end of the sheet with any part of the apparatus. As an additional safe-guard, however, to insure unfailing disengagement of the advance end of the sheet from the cutters or their carrying frame, as accomplished by stopping the forward revolution of the take-up roller as above explained, I find it advantageous to impart to said roller a slight backward revolution immediately after each action of the cutting mechanism, in order that said roller may lift the advance end of the cut sheet and absolutely disengage it from the cutters. This backward movement, when employed, may be occasioned in various ways. I find it convenient to resort to the following means:—The take-up roller E, or the friction roll e attached thereto, or both, may be made hollow to permit of their being loaded or partially filled with sand, shot, or other suitable granular, or other material, the tendency of which in the constant revolution of the roller in one direction is, as is well-known, to throw the roller slightly out of balance, so that when its revolution in the direction referred to ceases, it, by virtue of the unequal distribution of its load, will tend to take on a reverse movement until it comes to a central balance with its load in equilibrium. The take-up roller will cease its forward movement the instant the idler friction roll h^2 is lifted from it, and this is caused to take place just before the cutting blade has come in contact with the sheet of glue. The roller being loaded, as explained, would then immediately rotate backward if such rotation were not momentarily prevented.

To prevent the backward rotation of the take-up roller before the sheet has been severed, I provide any convenient restraining device such, for instance, as the ratchet wheel M, Figs. 4 and 6, applied to the roller, and adapted to be engaged by a pawl m pivoted to the frame-work at $m^\times$, and provided with a counterbalance in the form of an internally-projecting weighted arm m^2 adapted to retain

it in engagement with the teeth of the ratchet wheel except when its lower extremity is deflected. This deflection may be conveniently occasioned by forming on or applying to the movable cutter blade $f^{\times}$ a lug or projection f^{2} adapted in the forward movement of the movable blade to encounter said pawl and deflect it to effect the temporary release of the ratchet and permit of the equilibration of the roller at the instant when the cut is completed and when the backward movement of the roller is desired.

Having thus described my invention, I claim—

1. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly,—a stripping roller for stripping the sheet of jelly from the surface of the cylinder,—cutting mechanism for dividing the sheet transversely into sections,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

2. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—mechanism for arresting the forward movement of the advance end of the sheet during the action of the cutting mechanism,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

3. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—mechanism for arresting the forward movement of the advance end of the sheet during the action of the cutting mechanism,—mechanism for occasioning the backward movement of the advance end of the sheet immediately after the action of the cutting mechanism,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

4. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly,—a stripping roller the surface of which travels at a speed superior to that of the carrying surface of the cylinder and strips the sheet from said cylinder,—a sheet-delivering mechanism for receiving the sheet of jelly from the surface of the stripping roller and delivering it to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—mechanism for arresting the forward movement of the advance end of the sheet during the action of the cutting mechanism,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

5. In an apparatus for the manufacture of glue the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly,—a stripping roller the surface of which travels at a speed superior to that of the carrying surface of the cylinder and strips the sheet from said cylinder,—a sheet-delivering mechanism for receiving the sheet of jelly from the surface of the stripping roller and delivering it to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—mechanism for occasioning the backward movement of the advance end of the sheet immediately after the action of the cutting mechanism,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

6. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—mechanism for occasioning the backward movement of the advance end of the sheet immediately after the action of the cutting mechanism,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

7. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly,—a stripping roller the surface of which travels at a speed superior to that of the cylinder and strips the sheet from said cylinder,—a sheet-delivering mechanism for receiving the sheet of jelly from the surface of the stripping roller and delivering it to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—mechanism for occasioning the backward movement of the advance end of the sheet immediately after the action of the cutting mechanism,—and traveling nets for carrying off said sections,—substantially as and for the purposes set forth.

8. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid

glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—a take-up roller between the cooling cylinder and the cutting mechanism, over which the sheet is caused to pass,—means for occasioning the predetermined intermittent forward rotation and rest of said roller,—and traveling nets for carrying off the cut sections,—substantially as and for the purposes set forth.

9. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—a take-up roller between the cooling cylinder and the cutting mechanism over which the sheet is caused to pass,—means for occasioning the predetermined intermittent forward rotation and rest of said roller,—mechanism for occasioning the partial backward revolution of said roller immediately after the action of the cutting mechanism,—and traveling nets for carrying off the cut sections,—substantially as and for the purposes set forth.

10. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—a take-up roller disposed between the cooling cylinder and the cutting mechanism and operative in connection with a shiftable granular or kindred load, over which the sheet is caused to pass,—means for occasioning the predetermined intermittent rotation and rest of said roller,—and traveling nets for carrying off the cut sections,—substantially as and for the purposes set forth.

11. In an apparatus for the manufacture of glue, the following elements in combination:—a feed for liquid glue,—a revoluble cooling cylinder upon the surface of which the liquid glue is delivered and congealed into a sheet of jelly, and from which the sheet is stripped and conducted to the cutting mechanism,—cutting mechanism for dividing the sheet transversely into sections,—a take-up roller disposed between the cooling cylinder and the cutting mechanism and operative in connection with a shiftable granular or kindred load, over which the sheet is caused to pass,—means for occasioning the predetermined intermittent forward rotation and rest of said roller,—mechanism for occasioning the partial backward revolution of said roller immediately after the action of the cutting mechanism,—and traveling nets for carrying off the cut sections,—substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 12th day of April, A. D. 1894.

CHAS. W. COOPER.

In presence of—
J. BONSALL TAYLOR,
F. NORMAN DIXON.