

J. B. BOLTON.
 APPARATUS FOR GASSING YARN OR THREAD.
 APPLICATION FILED FEB. 2, 1910.

1,000,770.

Patented Aug. 15, 1911.

4 SHEETS—SHEET 1.

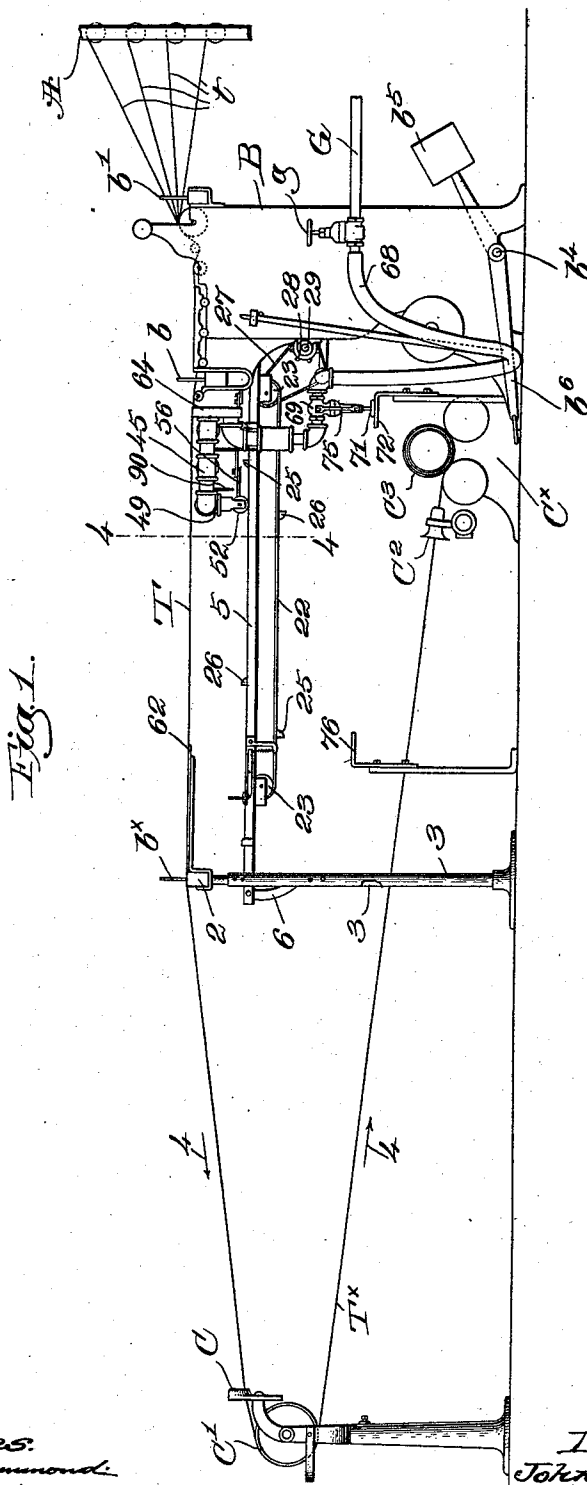


Fig. 1.

Witnesses:
 Thomas J. Diamond,
 Joseph M. Ward.

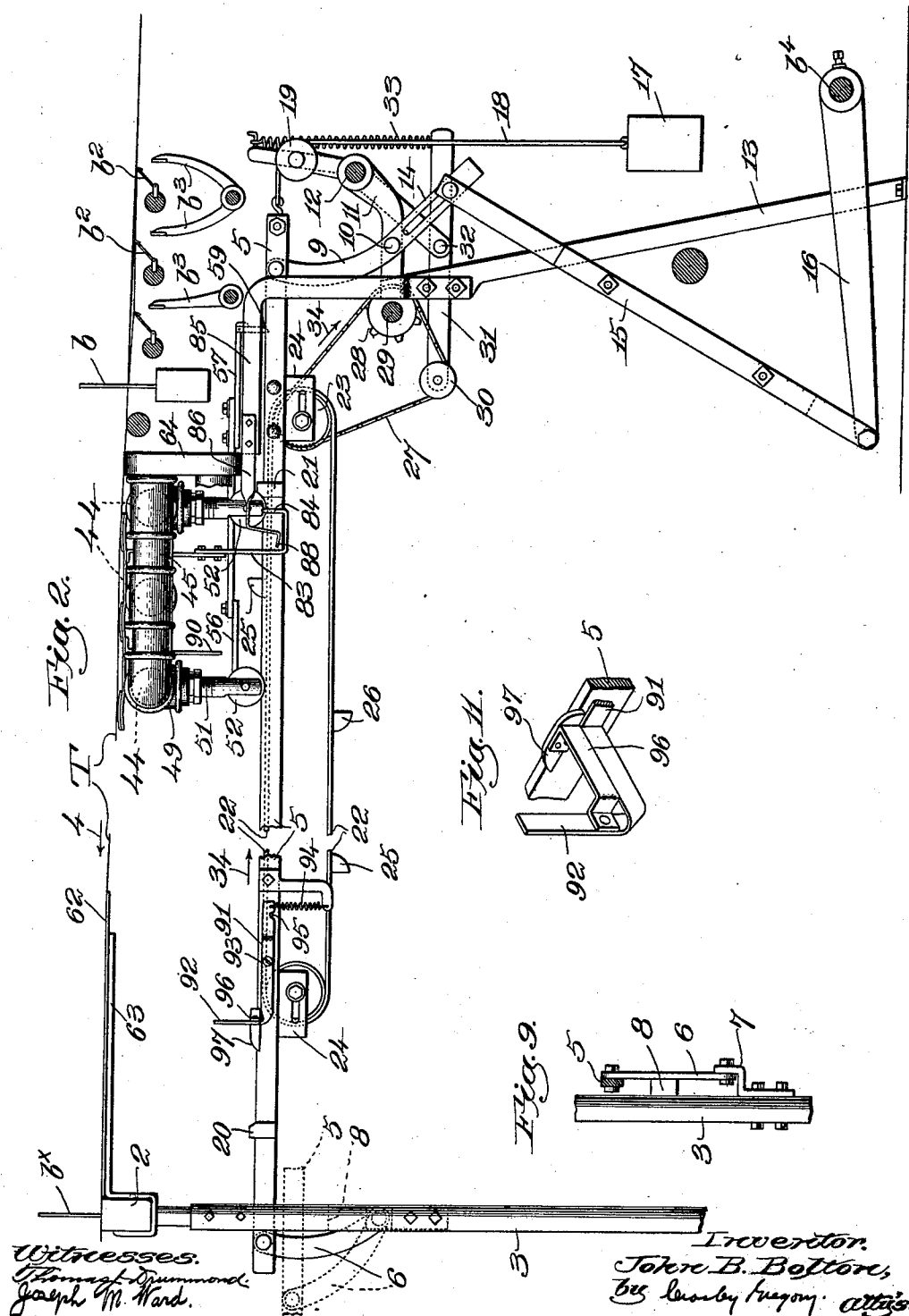
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4 SHEETS—SHEET 2.



Witnesses.
 Thomas Drummond,
 Joseph M. Ward.

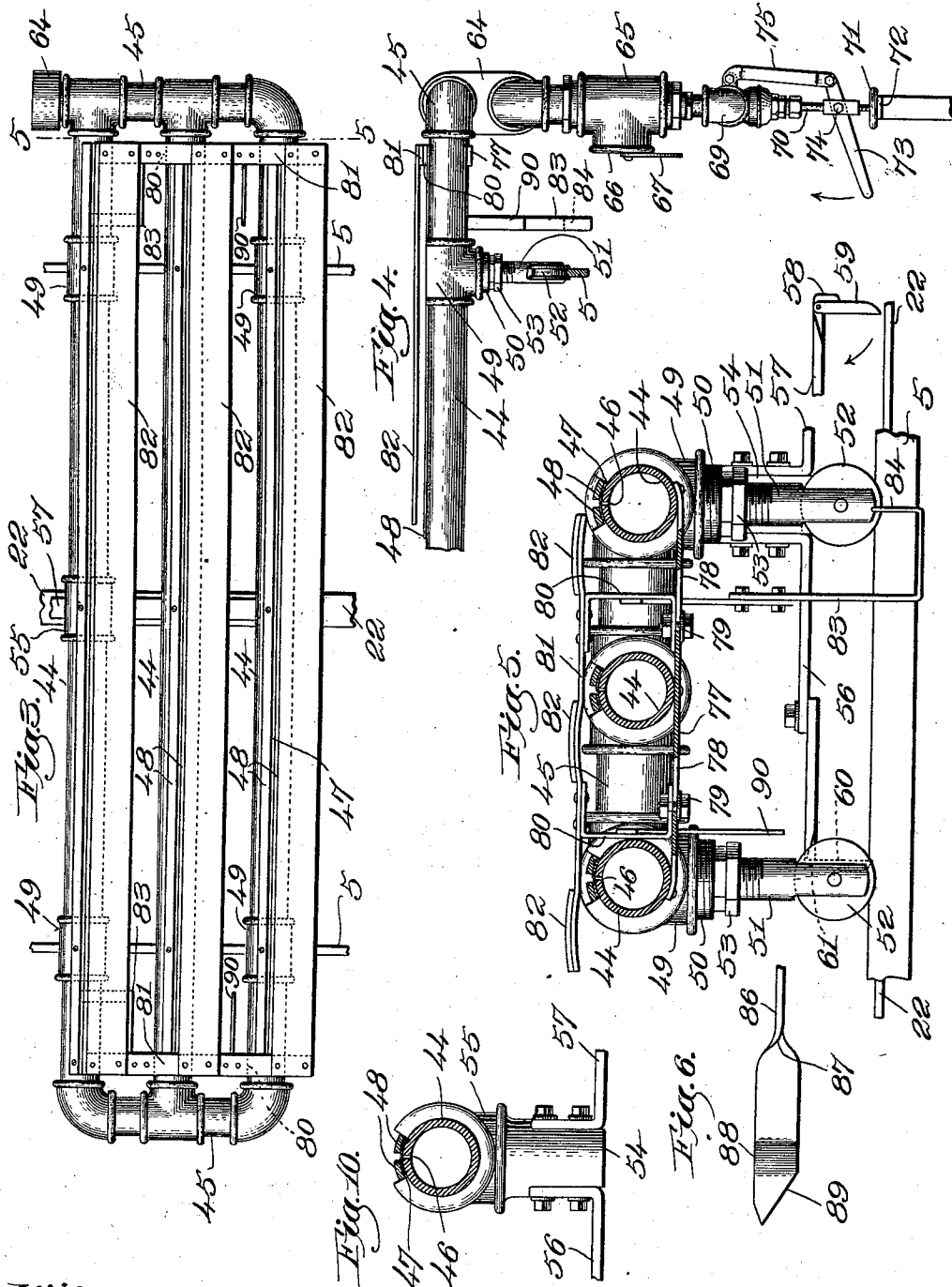
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4 SHEETS—SHEET 3.



Witnesses.
 Thomas J. Drummond.
 Joseph M. Ward.

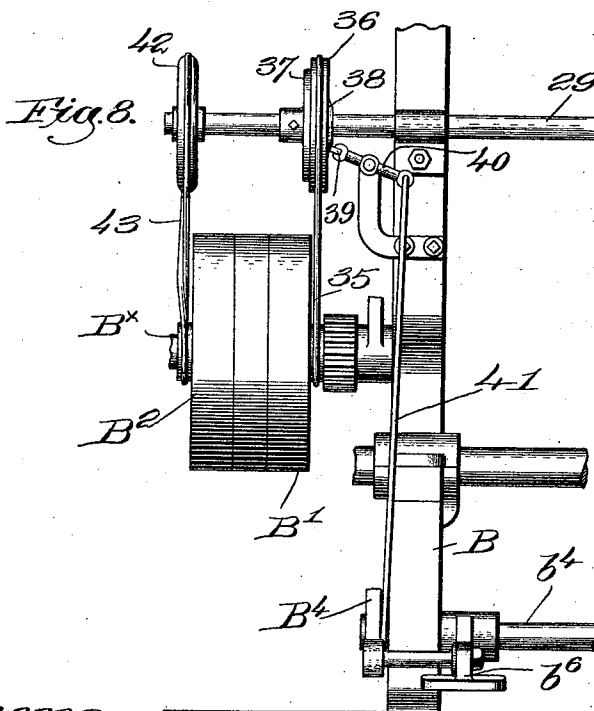
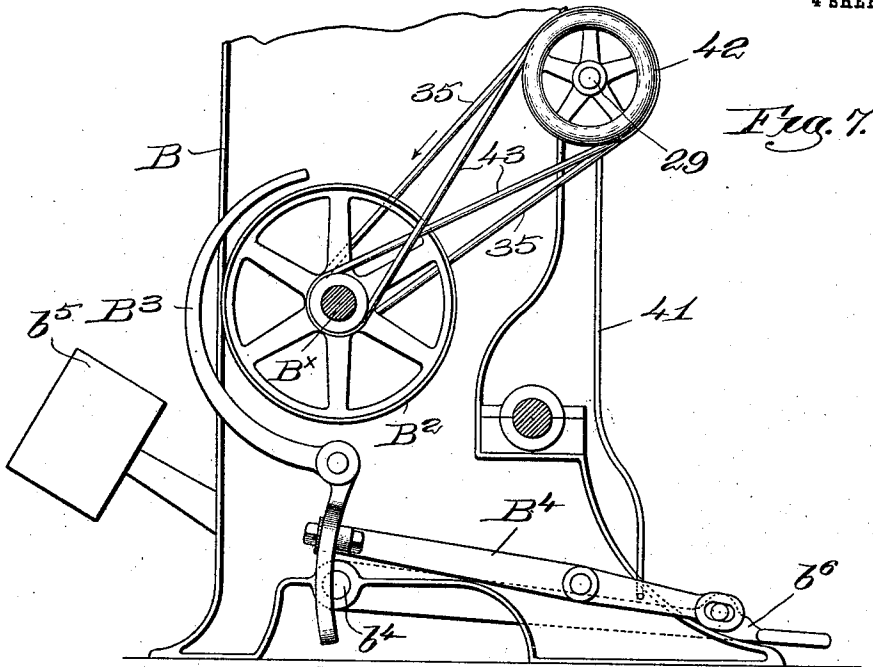
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR GASSING YARN OR THREAD.

1,000,770.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed February 2, 1910. Serial No. 541,570.

To all whom it may concern:

5 Be it known that I, JOHN B. BOLTON, a citizen of the United States, and resident of Methuen, county of Essex, State of Massachusetts, have invented an Improvement in Apparatus for Gassing Yarn or Thread, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing
10 representing like parts.

15 This invention relates to apparatus for gassing yarn or thread by means of a gas flame in order to remove therefrom fine fibers, fluff and the like. Heretofore this operation has been carried out with individual threads or yarns, each one being led from a suitable bobbin or spool through guides to another spool, onto which it is wound, and in its travel from one to the other spool each
20 yarn or thread passes through or in close proximity to a small gas flame.

25 Inasmuch as each yarn or thread is gassed by itself it will be manifest that great lack of uniformity in treatment must result, for on a frame sustaining a large number of the individual gassing devices some of the yarns or threads may be over-gassed, others insufficiently gassed, and still others will be properly treated, very slight variations in the flame resulting in wide differences in
30 the condition of the gassed yarn. Not only is the lack of uniformity in the product very objectionable, but the present system is slow, cumbersome and expensive, for each yarn or thread has to be unwound from one spool and wound upon another after gassing without regard to subsequent operations. The operation is slow, because each frame can treat only a relatively small number of
35 yarns or threads, and hence a large number of the frames must be provided where the quantity of yarn to be gassed is considerable, and a large amount of floor space is required to accommodate the frames.

40 My present invention has for its object the production of means whereby a large number of yarns or threads, several hundred, in fact, may be gassed simultaneously and with perfect uniformity, in a rapid and efficient manner and in a relatively small
45 space. To this end the yarns or threads in the form of a sheet are caused to travel longitudinally at proper speed and while in motion they are subjected to the action of
50 a flame, by means of which the individual

yarns are gassed properly and uniformly. Inasmuch as the travel of the sheet of yarn or thread (hereinafter sometimes termed the filamentous sheet, for brevity) must be stopped when an end breaks I have made
55 provision for stopping travel of the sheet automatically upon such failure of an end, or ends. When the travel of the sheet is stopped there must be an immediate interruption of the gassing action, to prevent
60 burning of the yarns or threads, and accordingly I have provided automatic means to render inoperative the gassing instrumentality concurrently with stoppage of travel of the sheet.

65 I have provided means to control automatically the position of the gassing instrumentality in the direction of travel of the sheet, to obviate the occurrence of ungassed portions in the filamentous sheet when the apparatus is stopped and then started up.
70 The gassing instrumentality comprehends a burner which provides for a flame, or series of flames, extended transversely of and adjacent the sheet, when operative, and when
75 the apparatus is in motion the burner is located at a certain point.

80 When the apparatus is stopped the gassing instrumentality is caused to move bodily in the direction of travel of the sheet, and also far enough therefrom to stop the gassing action, as will be explained in detail hereinafter, the longitudinal movement of such instrumentality carrying it forward
85 to such a point that it is ahead of the line of demarcation between the ungassed and the gassed portions of the sheet. When the apparatus is started up the gassing instrumentality is moved toward the filamentous
90 sheet to place the burner at the proper distance therefrom, and it is also moved backward, opposite to the travel of the sheet, to its normal operative position, the gassing beginning as soon as the burner arrives at
95 the proper distance from the sheet. During the retractive movement of the gassing instrumentality the sheet is traveling ahead, but as the gassing begins substantially simultaneously with the resumption of travel of the sheet it will be clear that there
100 cannot be any portion of the latter which is not subjected to the action of the gassing flame. A previously gassed portion of the sheet will again be subjected to the action
105 of the flame, but that is unobjectionable as

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the second action of the flame has practically no effect on the gassed portion, and the elimination of ungassed portions of the sheet is of the greatest importance in securing a uniform product.

The movements of the gassing instrumentality are controlled and effected automatically in my present invention, so that a number of apparatus can be looked after by one attendant, his principal duties being confined to piecing-up broken ends, starting the apparatus, and regulating the flame of the burner whenever it may be necessary. A warper collects the ends from several hundred spools mounted in a creel, arranges the ends in sheet form and effects travel of the same through suitable reeds or combs to a beam, upon which the filamentous sheet is wound, or by means of a trumpet the yarns or filaments composing the sheet are gathered together in the form of a loose rope or chain which is wound into a so-called "ball." Such warpers, which are of well known construction, are provided with stop-motion devices which effect automatic stoppage in the travel of the sheet upon failure of an end, and I have in the present instance combined the gassing instrumentality with a warper, whereby as a matter of fact the warping and gassing operations are carried on simultaneously, with a great saving in time and labor and with a material economy in space.

As will appear hereinafter the gassing instrumentality as a whole is automatic in its operation, and controlled by or through the stop-motion, so that the only manual operations required are piecing-up and starting after stoppage.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a side elevation of a yarn gassing apparatus embodying one practical embodiment of my present invention, illustrating the gassing means in combination with a warper, whereby the warping and gassing operations are conducted simultaneously, the parts of the apparatus being shown in the position maintained while the sheet of yarn or thread is in motion; Fig. 2 is a similar view, but on an enlarged scale and centrally broken out, of the gassing instrumentality and its carriage, and the carriage-actuating means, but omitting the gas-controlling means, certain parts of the warper being shown in section on a vertical longitudinal plane between the usual side-frames thereof; Fig. 3 is an enlarged top plan view of the gassing instrumentality and its carriage, and showing the burner shields in normal, inoperative position; Fig. 4 is a detail in front elevation, on a large scale, of a portion of the gassing instrumen-

mentality, and the means, omitted from Fig. 2, for controlling automatically the flow of gas to the burner, the view being taken on the line 4—4, Fig. 1, looking toward the right; Fig. 5 is a transverse section on the line 5—5, Fig. 3, looking toward the left and somewhat enlarged, to show the means for supporting the movable burner shields and also more clearly illustrating the construction of the burner itself; Fig. 6 is a top plan view, enlarged, of the cam by which is effected the movement of the burner shields into operative position with relation to the burner, said cam being shown in side elevation in Fig. 2; Fig. 7 is a side elevation, enlarged, of a portion of the opposite side of the warper shown in Fig. 1, to illustrate the means by which movement of the carriage is effected automatically in the direction of travel of the filamentous sheet; Fig. 8 is a front elevation of the mechanism shown in Fig. 7, viewing the latter from the right; Fig. 9 is a detail, to be referred to, of one of the standards with which the front or outer end of the carriage-track or support is pivotally connected; Fig. 10 is a detail of the latch-carrier and its connection with the carriage of the gassing instrumentality, the latches being shown in Figs. 2 and 5, said latches cooperating intermittingly with the carriage-moving means, as will be explained; Fig. 11 is a perspective detail of a portion of the device for returning the burner shields to inoperative position at the proper time.

In the present embodiment of my invention I have shown a common form of warper as the mechanism for collecting the yarns or threads to be gassed and arranging them in the form of a flat sheet, and for effecting longitudinal travel of the latter, and the gassed yarns or threads are shown as gathered into a loose rope or chain and wound in cylindrical form technically termed a "ball", but it is to be understood that this is merely illustrative of my invention, for any other suitable mechanism may be employed for effecting longitudinal travel of the filamentous sheet.

Referring to Fig. 1, A represents a creel-frame supporting the spools from which the individual yarns or threads t are led to the warper, indicated as a whole at B, and having usual combs or reeds b, b' spaced apart a short distance to separate the filaments and form them into a flat sheet T, suitable drop-wires b^2 , Fig. 2, cooperating with and arresting vibrators b^3 when an end fails, *i. e.*, breaks or runs out, to effect stoppage automatically of longitudinal travel of the filamentous sheet T. The drop-wires and vibrators, rock-shaft b^4 having an attached weight b^5 and a starting treadle b^6 , the fast and loose pulleys B', B^2 , Figs. 7 and 8, on shaft B^x , the belt-shipper B^3 operated by

the arm B^4 pivotally connected with the treadle b^6 , and the intervening connections, (not shown) between the vibrators and the starting and stopping rock-shaft b^4 constitute mechanism for stopping automatically and starting manually the warper, and may be of any well known or usual construction, forming no part of my invention. A very similar structure is shown and described in United States Patent No. 624,541 granted May 9, 1899 to Rhoades, it being understood by those skilled in the art that upon arrest of a vibrator by a drop-wire the weight b^5 descends, turning shaft b^4 and through lateral movement of the belt-shipper B^3 shifting the driving belt, (not shown) from the fast to the loose pulley, to stop the warper, the treadle b^6 at such time being elevated. By depressing the elevated treadle the parts are restored to the running position herein illustrated and thereby power is shifted from the loose to the fast pulley. At some distance in front of the reed or comb b , which hereinafter is termed the inner reed, I provide an outer reed b^* , the two reeds being some four or six feet apart, more or less, so that a considerable length of the filamentous sheet T lies between the reeds in a substantially horizontal plane, the base 2 of the outer reed being fixedly mounted on two upright, laterally separated standards, 3, 3 which are firmly attached to the floor.

As illustrated in Fig. 1 the sheet of yarns or threads passes from the outer reed to and are collected by a guide-eye or trumpet C into a loose chain or rope, indicated at T^* , which is carried around a suitably sustained pulley C' and thence back to the traversing guide C^2 of a so-called balling machine, indicated as a whole at C^x , the rope or chain being wound thereby into a ball C^3 , the balling instrumentality in practice being driven by suitable gearing from the warper.

A combination warper and balling machine is well known in the art, an example thereof being found in United States Patent No. 336,389 granted to Clark February 16, 1886, and as the balling machine forms no novel part of my invention further description thereof is unnecessary.

It will be manifest that the draft on the yarns or threads as the chain T^* is wound up by the balling machine will effect longitudinal travel of the chain and the filamentous sheet T in the direction of arrows 4, Figs. 1 and 2, and such travel is arrested when the warper stops, for the winding device C^x stops and starts with stoppage and starting of the warper. Should it be desired to wind the sheet onto a beam the sheet of yarns or threads would pass from the outer reed b^* to a suitably driven beam, and as it is as common practice to wind the yarns or threads from a warper upon beams as into balls no further illustration

is believed to be necessary herein. A track comprising parallel rails, as 5, is mounted below and parallel to the path of the filamentous sheet T , see Figs. 1 and 2, the outer end of each rail being pivotally connected by an upturned swinging arm 6 with a bracket 7, Fig. 9, on the inner side of each standard 3, a rail-stop 8 being fixed on the latter to cooperate with the adjacent rail when the track is lowered to dotted line position, indicated at the left, Fig. 2. Each rail at its inner end, which extends beneath the vibrators b^3 , Fig. 2, is pivotally connected with a swinging arm 9 fulcrumed at 10 on a bracket 11, the two brackets, one for each rail, being fixedly mounted on a cross-rod 12 of the warper and to braces 13 bolted to the floor, the pairs of arms 6 and 9 making a species of parallel motion for the track, by which it maintains its parallelism with the sheet T while it is movable from and toward it. Slotted extensions 14 of the arms 9 are pivotally connected by links 15 with rocker-arms 16 fast on the rock-shaft b^4 of the stop-motion, and the links are shown as made in two parts for ready longitudinal adjustment, the slotted extensions 14 also providing for adjustment of the links therewith toward or from the fulcra 10.

When travel of the sheet T is stopped, as by the failure of one of the component yarns or threads, the rock-shaft b^4 is turned to swing up the rocker-arms 16, and consequently the track will be lowered to dotted line position, Fig. 2. A reverse movement takes place when the treadle b^6 is depressed to cause the sheet T to resume its longitudinal travel, and the track is thereby returned to its normal position nearer the filamentous sheet. Such return movement of the track is assisted by weights 17 connected by flexible members 18 with the inner ends of the track rails 5 and traveling over fixedly sustained guide sheaves 19.

The gassing instrumentality is mounted upon the track and movable longitudinally thereon, such movement being limited by suitable stops 20, 21 on the rails, the normal, operative position of such instrumentality being below and close to the filamentous sheet T and near the inner reed b , as shown, in Figs. 1 and 2, but before describing such instrumentality the actuating means for effecting movement thereof upon the track will be explained. Between the rails 5 a flexible endless belt 22 is mounted on suitable guide-pulleys 23 adjustably sustained by brackets 24 attached to and depending from the rails, the upper run of the actuator traveling in a path between and slightly below the tops of the rails, said actuator having attached to it oppositely faced projections 25, 26.

The projections are shaped to present each

a straight engaging face and a convex back, and as will appear hereinafter the straight faces of the projections 25 act only to effect inward movement of the gassing instrumentality while the straight faces of the projections 26 act only to effect outward movement of such instrumentality, upon the track.

The inner one of the guide-pulleys 23, as herein shown, is driven by a sprocket-chain or belt 27, Fig. 2, from a sprocket-wheel 28 fast on a transmitting shaft 29 mounted on the warper frame, the flexible member 27 being kept taut by a tension-sheave 30 mounted on an arm 31 fulcrumed at 32 and controlled by a spring 33, Fig. 3, the direction of movement of the actuator 22 and driving member 27 when the filamentous sheet is in motion being indicated by arrows 34. Transmitting shaft 29 is driven in any convenient manner, and herein I have shown it as driven normally from the hub of the fast pulley B', Figs. 7 and 8, by an open belt 35 engaging a sheave 36 which is made as the loose member of a friction clutch, the other member 37 being fixed on the shaft 29. The side of the sheave 36 has a cam portion 38 which is engaged by a roll 39, Fig. 8, on a rocker-arm 40 to press the sheave tightly against the fast member 37, to rotate the latter and said shaft 29, whenever the treadle b^6 acts through a link 41 to maintain the roll 39 in its operative position.

When travel of the filamentous sheet is arrested the rise of the treadle acts through said link to move the roll 39 off the cam part 38, and the clutch is opened, the sheave 36 ceasing to rotate when the fast pulley B' stops. A second sheave 42 fast on the transmitting shaft 29 at its outer end is connected by a crossed belt 43 with the hub of the loose pulley B² of the warper, and when the power is shifted from the fast to the loose pulley to stop the warper the pulley B² is started up and through the crossed belt 43 reverses the direction of rotation of shaft 29, and by the described connecting means the direction of travel of the endless actuator 22 is reversed. That is, when the filamentous sheet is in motion the upper run of the actuator 22 is moving opposite to the travel of the sheet and when movement of the latter is arrested the movement of the actuator is reversed and its upper run travels opposite to the arrow 34, Fig. 2, and when travel of the sheet is resumed the movement of the actuator is again reversed, because at such time the crossed belt 43 becomes inactive and the clutch 37, 38 is closed, the open belt 35 becoming active. Such movement of the actuator, in one or the other direction, is made effective to govern automatically the longitudinal bodily movement of the gassing instrumentality longitudinally

of the filamentous sheet, for purposes to be explained.

The gassing instrumentality.—Broadly speaking this instrumentality comprehends a suitable gassing burner, a carriage upon which it is mounted and which travels upon the track, and a device to shield the burner when the gassing action is to be arrested, it being understood that the component yarns or threads of the filamentous sheet are gassed simultaneously as the sheet is caused to travel longitudinally within operative range of the gassing flame provided by the burner.

Referring now to Figs. 3 and 5 the burner is shown as a series of elongated tubes or pipes 44, three being illustrated, connected at their opposite ends by suitable headers 45 and of sufficient length to extend horizontally from edge to edge of the sheet T and beneath the same, each tube, which is in itself a burner, having a fine longitudinal slit 46 in its top, preferably covered by a strip 47 of wire gauze held in place by parallel metal ribs or strips 48, the latter in a measure also defining and preventing spreading of the flame when the gas issuing through slit 45 is ignited, the gauze giving a uniform flame throughout the length of the burner.

The number of burner members, and their precise construction, may be varied or modified in different details without departing from the spirit and scope of my invention, as herein but one very practical and efficient form of burner is shown and described.

Suitable T-couplings 49 fixed on the two outer burner tubes 44 have depending therefrom tapped plugs 50 to receive threaded legs 51, shown as bifurcated at their lower ends, Fig. 4, to receive each a flanged truck-wheel 52, the truck-wheels and their connected sustaining legs constituting a burner carriage, a pair of the wheels 52 traveling on each of the rails 5 of the track. Check-nuts 53 lock the legs in the plugs 50, and by loosening the nuts the legs can be turned in one or the other direction to thereby adjust the distance between the track rails and the top of the burner, this adjustment regulating the normal distance of the burner members from the path of movement of the filamentous sheet, as will be apparent. The burner is provided with fuel, such as a suitable inflammable mixture of air and gas, from a suitable source of supply, to be referred to hereinafter, and the normal, operative position of the gassing instrumentality is shown in Figs. 1 and 2, so that the naked flames of the burner will act upon the sheet of yarns or threads near the inner reed b , and they will be gassed as the travel of the sheet draws the yarns or threads through the flame. Thus all of the component filaments of the sheet T will be gassed simul-

taneously, uniformly and rapidly, many hundred ends being gassed in a relatively small space.

When travel of the filamentous sheet is arrested the track is caused to descend, as has been described, thereby moving the gassing instrumentality away from such sheet burned. To insure absolute safety I also shield the burner members and throttle or reduce the supply of gas, as will appear, so that not only is the burner dropped away from the sheet but the gassing flame is reduced and a shield device is interposed between the reduced flame and the sheet. The gassing instrumentality is also moved outward upon the track when travel of the filamentous sheet is arrested, and afterward moved inward when such travel is resumed, by coupling temporarily the burner carriage and the actuator 22. A depending support 54 conveniently made as a part of a T-coupling 55, Figs. 3 and 10, on the innermost one of the burner tubes 44 has secured to it opposite and preferably adjustable arms 56, 57 which constitute a latch-carrier, extended above the upper run of the actuator 22, see Fig. 2. The carrier arm 57 projects inward, or toward the reed *b*, is downturned at its end, at 58, and provided with a depending pivoted latch 59 which can swing to the left, Fig. 5, but its opposite movement is stopped by the part 58. A similar latch 60 is mounted on the outer end of the carrier arm 56, adapted to swing to the right, Fig. 5, but stopped from opposite movement by the downturned end 61 of arm 56. In practice these latches hang over and clear the plane in which the upper run of the actuator 22 travels, and the latch 59 cooperates at times with a projection 25 while at other times the latch 60 cooperates with a projection 26, to temporarily couple or connect the actuator and the burner carriage.

Viewing Figs. 1 and 2, suppose travel of the filamentous sheet T is arrested. The track descends immediately, lowering the gassing instrumentality, and simultaneously the travel of the actuator 22 is reversed, so that its upper run moves oppositely to arrow 34, Fig. 2, and the straight face of the first projection 26 which engages latch 60 will cause the burner carriage to move outward on the lowered track until the stops engage the leading truck-wheels 52. Before such engagement, however, the operating projection 26 will travel down around the outer pulley 23 and releases the latch, the momentum of the carriage completing its outward movement, and as the actuator brings other projections 25, 26 against the inner latch 59 the latter is lifted, wiping over one projection after another without hindrance. The gassing instrumentality is now at the outer end of its run, near the outer reed *b*^x, and remains there as long as

the filamentous sheet is at rest, at a point a considerable distance forward of the un-gassed part of the sheet. If an attendant is running several of the machines the burner carriage may remain at the outer end of its run for some time and to prevent any possible damage to the yarns or threads above it I have provided a guard or shield 62, beneath the sheet T, and supported on brackets 63, such guard being made of asbestos or other suitable non-conductor of heat. When the treadle *b*^o is depressed to start up travel of the filamentous sheet, after correction of the fault which caused stoppage of such travel, the movement of the actuator 22 is reversed automatically, as will be remembered, so that its upper run travels in the direction of arrow 34, Fig. 2, and at the same time the automatic rise of the track replaces the gassing instrumentality in operative position. The first projection 25 whose straight face now engages the latch 59 will cause the burner carriage to move inward upon the track, to its normal position near the inner reed *b*, and during such inward run of the carriage the yarns or threads will be subjected to the action of the gassing flame. Thus there cannot be any un-gassed part of the sheet T due to stoppage of its travel, for when gassing action is resumed at or near the outer run of the burner carriage it is at a point on the sheet which has been previously gassed, and the flame begins its effective work just as soon as the un-gassed portion of the sheet is reached. The run of the burner carriage is of sufficient length to insure such an overlapping action of the gassing flame, making all proper allowance for some slight travel of the sheet, after power is thrown off, which may be due to the momentum of the moving parts of the sheet controlling mechanism. Release of the latch 59 and the cooperating projection 25 is effected automatically as such projection travels around the inner pulley 23, the momentum of the carriage taking it along until the inner stops 21 engage the then leading truck-wheels 52.

When the carriage is in normal position, at the inner end of its run, the latch 60 wipes over the projections 25, 26 as they pass under it, as will be apparent. As the track moves outward when it descends the tension sheave 30, Fig. 2, permits the sprocket-chain 27 to accommodate such movement, the spring 33 acting through the said sheave to take up the slack when the track moves inward and upward to normal position. One of the headers 45 is provided at its inner end with a depending extension 64, Figs. 1 and 4, to which by suitable piping is connected a mixer 65, having an air inlet at 66 controlled by a suitable adjustable cover 67. A pipe G from a suitable source of gas supply, see Fig. 1, and having a shut-off

valve *g*, is connected by a flexible conduit 68 with a valve case 69 attached to the mixer, to conduct the burner gas thereto, the depending stem 70 of the valve having an adjustable foot 71, Fig. 4, which moves onto a fixed, shelf-like stand 72 when the burner carriage is moved inward, as shown in Figs. 1 and 4, and at such time the valve-stem is positioned to open the valve for a full supply of gas to the mixer. A tappet 73 is pivotally connected with the stem at 74 and fulcrumed on a link 75 depending from the valve-case. When the track descends, lowering the burner carriage, the foot 71 is pressed against the stand 72 and is thereby moved upward to partly close the controlling valve, thus throttling the supply of gas for the burner, and the free end of tappet 73 is swung upward, the proper throttling of the gas supply being effected before the foot 71 leaves the stand 72 on the outward run of the carriage. When the latter reaches the outer end of its run it carries the upturned end of the tappet 73 beneath an overhanging detent 76, Fig. 1, so that when the track and carriage are raised for the resumption of gassing the detent cooperates with the tappet to rock it on the lower end of link 75, thereby restoring the parts to the relative position shown in Fig. 4, and downward movement of the valve-stem 70 opening the controlling valve to turn on the working supply of gas. Thus the gas is throttled automatically when the gassing instrumentality is moved away from the filamentous sheet, and it is turned on again, automatically, when said instrumentality is restored to operative position with relation to the sheet of yarns or threads.

The means for shielding the burner members, and for governing the shielding means, will now be described, special reference being had to Figs. 2, 3 and 5, as the shields have been omitted in Fig. 1, owing to the small scale thereof. A plate 77, Fig. 5, is fixedly attached to the lower parts of the burner tubes 44 adjacent each header 45, the plates being slotted at 78 to receive the shanks of bolts 79 which are attached to oppositely bent struts 80, the tops of the struts being riveted to light bars 81 which are thus held somewhat above the tops of the ribs 48. As shown in Fig. 3 the two bars 81 are arranged in parallelism, at right angles to the burner tubes 44, and a series of burner shields 82 are riveted securely to said bars, one for each burner member, each shield being conveniently made of sheet metal, and slightly curved transversely, as shown in Fig. 5, the bars 81 being correspondingly curved to fit them. When the shields are retracted they expose the burner slits 46, as clearly shown in Figs. 2 and 5, so that the flame can have full access to the yarns or threads as they travel over the shields, see Fig. 2, but when

the bars 81 and the connected shields are moved to the right, Fig. 5, a distance equal to the length of slots 78 the shields will extend over the burner slits, and be interposed between the burners and the yarns or threads. To effect movement of the shields into such operative position I have attached to a strut 80 of each pair of struts a depending finger 83 having its lower end, outside one of the rails 5, bent back and then up at 84, as in Figs. 2 and 5, it being understood that one of these fingers is located at each side of the carriage. An L-shaped bracket 85, Fig. 2, is secured to the upper end of each brace 13, the horizontal arms of said brackets extending outward parallel to and above the track rails 5, and upon the extremity of each of such arms is attached a flat, resilient blade 86, twisted at right angles to itself at 87, Fig. 6, and terminating in a depending, bent cam foot 88, having a beveled outer edge 89.

When the gassing instrumentality is in normal position each cam foot overhangs and is beyond the upturned end 84 of the finger 83, as shown in Fig. 2, and when the track descends and the burner carriage moves outward the cam foot and finger end 84 engage long enough to pull the connected shields 82 into operative position over the burners, after which the cam foot yields and rides over and off the said finger end. Thus the burners are shielded and the yarns or threads of the sheet T protected practically concurrently with the throttling of the gas supply and the descent of the track and carriage, and the shields remain operative until the carriage is raised and run inward.

To return the shields to inoperative position I attach retracting fingers 90 to the struts 80 of the shield-carrying device, one at each side of the carriage, as shown, to cooperate with latches mounted on the rails 5. Each latch comprises a shank 91, Figs. 2 and 11, bent laterally and then upturned at its outer end, at 92, and pivoted at 93 to the outside face of the rail 5, a spring 94 holding the shank normally against a stop pin 95, Fig. 2, with the part 92 in the path of the corresponding finger 90 when the carriage is run out. When the finger engages the latch part 92 it presses the said part down, the latch turning on its fulcrum 93, so that the finger can wipe past and allow the carriage to complete its outward run, the spring 94 resetting the latch. Now when the inward run of the carriage begins the finger will engage the opposite face of the latch part 92, but the latter will not descend for the stop pin 95 prevents rocking of the latch, so the finger is held temporarily as the carriage moves inward, and thereby the burner shields 82 are retracted to inoperative position. Just as this is effected the truck-wheel 52 engages and depresses a shoe 97 carried

by an arm 96 fixedly attached to the latch, such depression of the shoe drawing down the upturned end 92 of the latch far enough to release the finger 90, the spring 94 resetting the parts after the truck-wheel leaves the shoe. As the inward run of the carriage continues the inner vertical edges of the upturned finger-ends 84 will engage the beveled edges 89 of the cam feet 88, referred to hereinbefore, and will press the feet laterally, the resilient blades 86 being flexed to permit the lateral movement of the cam feet, and returning them to operative position shown in Fig. 2 as the finger-ends pass by.

No further detailed explanation of the operation of the apparatus will be required, as the various operations, and the structures by which such operations are effected, have been explained in the body of the specification.

The apparatus herein shown and described is wholly automatic in operation, and the piecing-up of ends and the starting up of the apparatus after stoppages, are the only manual actions required, so that an attendant can run a number of the machines, each one stopping the gassing action automatically whenever the travel of the sheet of yarns or threads is arrested.

Various changes or modifications may be made by those skilled in the art in different details of construction and arrangement without departing from the spirit and scope of my invention as set forth in the claims annexed hereto.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination, with means to effect longitudinal movement of a series of yarns or threads in the form of a sheet, of an instrumentality to act upon and gas simultaneously the component yarns or threads of such sheet, a stop-motion for said sheet-moving means, set in operation by or through failure of an end, to arrest automatically travel of the sheet, and means actuated by the stop-motion to render inoperative the gassing instrumentality when travel of the filamentous sheet is arrested.

2. The combination, with means to effect longitudinal movement of a series of adjacent yarns or threads arranged in sheet form, of an instrumentality to gas simultaneously the component yarns or threads of such moving sheet, a stop-motion for the sheet moving means, set in operation by or through failure of an end, to arrest movement of the sheet, and means set into action by operation of the stop motion to effect a bodily movement of the gassing instrumentality in the direction of travel of the sheet to a point beyond the end of the previously gassed portion thereof.

3. The combination, with means to effect

longitudinal movement of a series of adjacent yarns or threads arranged in sheet form, of a gassing instrumentality movable longitudinally of and also toward and from such moving sheet, to gas simultaneously the component yarns or threads thereof, means controlled and set in operation by the failure of an end in the sheet to effect movement of the gassing instrumentality bodily in the direction of travel of the sheet to a point beyond the end of the previously gassed portion thereof, and means also controlled and set in operation by failure of an end to effect movement of said gassing instrumentality away from the filamentous sheet.

4. The combination, with means to collect a series of individual yarns or threads and arrange the same in the form of a sheet, and means to effect longitudinal movement thereof, of a gassing instrumentality to act upon such traveling sheet from one to the other edge thereof, said instrumentality being movable toward and from the sheet and also in the direction of its length, and mechanism set in motion by failure of an end in the sheet to render said gassing instrumentality inoperative, said mechanism including an actuator to cooperate intermittingly with and move said instrumentality in the direction of travel of the sheet, and means acting simultaneously to move said gassing instrumentality away from the sheet.

5. The combination, with a plurality of widely separated combs or reeds to cooperate with a series of yarns or threads in the form of a sheet, and means to effect longitudinal travel thereof, of a gassing instrumentality normally positioned to gas the yarns or threads of the sheet at a point near one of the combs, means to stop the longitudinal movement of the filamentous sheet, and mechanism governed by such means to move the gassing instrumentality away from the sheet and in the direction of movement thereof toward the second comb when travel of the sheet is stopped, said mechanism acting to return the gassing instrumentality to normal position near the first comb when travel of the sheet is resumed.

6. The combination, with means to effect longitudinal travel of a sheet of yarns or threads, and a stop-motion for said means, set in operation by breakage of an end to thereby arrest travel of the sheet, of a gassing instrumentality to act upon the yarns or threads simultaneously during travel of the same, and means controlled by the stop-motion to effect relative movement of the gassing instrumentality and the filamentous sheet away from each other when travel of the sheet is stopped, said means acting to effect relative movement of the sheet and the gassing instrumentality toward each other when travel of the sheet is resumed.

7. The combination, with a warper, and an automatic stop-motion therefor to arrest longitudinal travel of a sheet of yarns or threads upon failure of an end, of a gassing instrumentality to act simultaneously upon the component yarns or threads of the sheet during travel thereof, said instrumentality including a gas burner extended transversely of and adjacent the sheet, and means to throttle the gas supply automatically when travel of the sheet is arrested.

8. Mechanism to effect longitudinal travel of a series of yarns or threads arranged in the form of a sheet, and means to stop said mechanism upon failure of an end, combined with a gassing instrumentality to act upon the filamentous sheet during travel thereof and movable bodily into and out of operative position, said instrumentality including a burner extending transversely of and adjacent the sheet, and a burner shield, means to throttle the fuel supply for the burner, and means to position the shield between the burner and the filamentous sheet when travel of the sheet is arrested.

9. Mechanism to effect longitudinal travel of a series of yarns or threads arranged in the form of a sheet, and means to stop said mechanism upon failure of an end, combined with a gassing instrumentality to act upon the filamentous sheet during travel thereof and movable bodily into and out of operative position, said instrumentality including a burner extending transversely of and adjacent the sheet, a device rendered operative by or through movement of said instrumentality into inoperative position to throttle the fuel supply for the burner, and a device to open the fuel supply of the burner by or through movement of the gassing instrumentality to operative position.

10. Mechanism to effect longitudinal travel of a series of yarns or threads arranged in the form of a sheet, and means to stop said mechanism upon failure of an end, combined with a gassing instrumentality to act upon the filamentous sheet during travel thereof and movable bodily into and out of operative position, said instrumentality including a burner extending transversely of and adjacent the sheet, and a burner shield, and means acting upon movement of the gassing instrumentality to inoperative position to interpose the shield between the burner and the filamentous sheet when travel thereof is arrested.

11. Mechanism to effect longitudinal travel of a series of yarns or threads arranged in the form of a sheet, means rendered operative by or through failure of an end to stop said mechanism, and manually controlled devices acting through said means to start said mechanism, combined with a gassing instrumentality to act upon the filamentous sheet during travel

thereof, said instrumentality including a burner extended transversely of and adjacent the sheet, and a burner shield, means to position the shield between the burner and the filamentous sheet when travel thereof is arrested, and means to uncover the burner when travel of the sheet is resumed.

12. Means to effect longitudinal movement of a series of yarns or threads in the form of a sheet, mechanism to govern the longitudinal movement of the sheet and operating upon breakage of an end to arrest such movement, and a manually controlled member acting through said mechanism to start longitudinal movement of the sheet, combined with an instrumentality to subject simultaneously the component yarns or threads of the sheet to the action of a gassing flame, and controlling devices for such instrumentality, said devices operating respectively to render the gassing flame inactive when travel of the sheet is arrested, and to restore the flame to active operation when travel of such sheet is resumed.

13. The combination, with mechanism to effect longitudinal movement of a series of yarns or threads in the form of a sheet, means to stop the longitudinal movement of the sheet, and a manually controlled member acting through said means to start said mechanism, of a gassing instrumentality to act upon the component yarns or threads, said instrumentality being movable longitudinally of the sheet, means, including an actuator moving in one direction when the sheet is in motion and in the opposite direction when the sheet is at rest, to move said gassing instrumentality beyond the ungasped portion of the sheet when travel of the sheet is arrested, and to return said instrumentality to normal position longitudinally of the sheet when travel thereof is resumed, and means to reverse the direction of movement of the actuator when the movement of the sheet is stopped and started.

14. The combination, with mechanism to effect longitudinal movement of a series of yarns or threads arranged in the form of a sheet, means to stop the longitudinal movement of the sheet, and a manually controlled member acting through said means to start said mechanism, of a gassing instrumentality to act upon the component yarns or threads, said instrumentality being movable toward and from the sheet and also longitudinally thereof, means, including an actuator moving in one direction when the sheet is in motion and in the opposite direction when the sheet is at rest, to move said gassing instrumentality longitudinally of the sheet beyond the ungasped portion when travel of the sheet is arrested and to return said instrumentality to normal position longitudinally of the sheet when travel thereof is resumed, means to reverse the direction of

movement of the actuator when the movement of the sheet is stopped and started, and mechanism to effect movement of the gassing instrumentality toward and from the filamentous sheet.

15. The combination, with mechanism to effect longitudinal movement of a series of yarns or threads arranged in the form of a sheet, and means to stop travel of the sheet by or through breakage of an end thereof, of a movable track below and parallel to the path of such sheet, a carriage movable upon the track longitudinally of the filamentous sheet, a gassing burner mounted on the carriage and adapted to gas the component yarns or threads of the sheet, means to effect movement of the track, and the burner carriage thereon, toward and from the filamentous sheet, movement of said carriage upon its track changing the position of the gassing burner with relation to the length of the filamentous sheet, and means to move the carriage upon said track.

16. The combination, with mechanism to effect longitudinal movement of a series of yarns or threads arranged in the form of a sheet, of a gassing burner normally acting upon the yarns or threads at a certain point in the path of the sheet, means operating when travel of the sheet is arrested to move automatically the burner ahead beyond the ungasped portion of the sheet, devices brought into operation by such movement of the burner to render the latter inoperative, and devices to render operative said burner when the burner is returned to its normal position.

17. The combination, with mechanism to effect longitudinal movement of a series of yarns or threads arranged in the form of a sheet, of a gassing burner normally acting upon the yarns or threads at a certain point in the path of the sheet and movable longitudinally of such sheet, mechanism to govern such movement of the burner and including a member to cooperate temporarily with and advance the burner beyond the ungasped portion when travel of the sheet is arrested and to cooperate temporarily with and return the burner to normal position when travel of the sheet is resumed, devices acting to render inoperative said burner when it is advanced, and devices to render operative the burner upon its return movement to normal position.

18. The combination, with mechanism to effect longitudinal movement of a sheet of yarns or threads, and means to stop travel of the sheet by or through breakage of an end thereof, of a gassing burner and a carriage on which it is mounted, a track for the carriage below and parallel to the path of movement of the filamentous sheet, means to lower the track automatically when travel of the sheet is arrested and thereby render

said burner inoperative, a device acting through said means to raise the track at will, and actuating means to effect outward movement of the carriage when the track is lowered, said means acting to effect return movement of the carriage after the track is raised, to obviate ungasped portions in the filamentous sheet.

19. The combination, with mechanism to effect longitudinal movement of a sheet of yarns or threads, and means to govern the operation of said mechanism, of a gassing instrumentality to gas the component yarns or threads of the sheet, said instrumentality being movable bodily longitudinally of the sheet, actuating means to effect such bodily movement controlled by said governing means, and including an endless actuator moved in one direction when travel of the sheet is stopped and moved in the opposite direction when travel of the sheet is resumed, and means to reverse automatically the direction of movement of the actuator when travel of the sheet is stopped or started.

20. The combination, with mechanism to effect longitudinal movement of a sheet of yarns or threads and a stop-motion therefor operated by or through failure of an end, of an instrumentality to act upon and gas the yarns or threads of the sheet, said instrumentality being movable bodily longitudinally of the sheet, actuating means to effect such bodily movement including an endless actuator moved in one direction when travel of the sheet is started, to thereby move said gassing instrumentality to abnormal position, and moved in the opposite direction when travel of the sheet is resumed, to thereby return said instrumentality to abnormal position, and means to reverse automatically the direction of movement of the actuator by or through change from running to stopping condition, or vice versa, of said stop-motion.

21. In apparatus for gassing yarn or thread, a gassing burner means to vary the distance between it and the yarns or threads to be gasped, means actuated automatically to throttle the gas supply when the distance between the burner and the yarns or threads is increased, said means being actuated reversely when such distance is decreased, to restore the gas supply, and means, including a longitudinally movable actuator, to move the burner in the direction of travel of the yarns or threads while the gas supply is throttled.

22. In apparatus for gassing a traveling sheet of yarns or threads, a plurality of longitudinally-slitted burner-tubes, a carriage on which they are mounted, and a track for the carriage, combined with a plurality of shields movably mounted on the carriage and adapted to cover or uncover the burner-

slits, means to effect outward movement of the carriage upon its track, and devices to cause the shields to cover the burner-slits when the carriage is moved outward.

5 23. In apparatus for gassing a traveling sheet of yarns or threads, a multiple-flame burner, a carriage therefor movable in the direction of travel of the filamentous sheet, means to effect outward movement of the carriage when travel of the sheet is arrested, and shield devices moved automatically into position between the filamentous sheet and the burner flames when said carriage is moved outward.

15 24. In apparatus for gassing a traveling sheet of yarns or threads, a plurality of connected, parallel and elongated burner-pipes to provide flames adapted to extend from edge to edge of the filamentous sheet, a carriage comprising truck-wheels and their supports, adjustably connected with the burner-pipes, a track for and upon which the carriage is movable in the direction of travel of the filamentous sheet, actuating means to effect movement of said carriage upon the track, a gas-supply conduit connected with the burner-pipes, and devices adjacent the opposite ends of the track, to throttle automatically the gas flow when the carriage is moved outward and to increase the flow when return movement of said carriage begins, respectively.

25. In apparatus for gassing a traveling sheet of yarns or threads, a burner adjacent and extended transversely of such filamentous sheet, a carriage for the burner, a track upon which the carriage is movable in the direction of travel of the sheet, oppositely acting latches connected with the carriage, actuating means for the latter, including an endless actuator having two sets of projections thereon, each set adapted to cooperate temporarily with one of the latches and move the carriage upon the track, devices to move the endless actuator in one direction when the filamentous sheet is in motion, and devices to effect a reversal in the movement of said actuator when the sheet is at rest, combined with stops to limit travel of the carriage upon the track.

26. The combination, with mechanism to effect longitudinal travel of a sheet of yarns or threads, governing means therefor, including fast and loose pulleys, and a belt-shipper moved manually to starting position and moved automatically to stopping position by or through failure of an end, of a gassing instrumentality movable toward and from the filamentous sheet and also longitudinally thereof, means controlled by said governing means to move said instrumentality away from such sheet when travel thereof is stopped, and to return it when travel of the sheet is resumed, and actuating means, to effect intermittent longitudinal

movement of said gassing instrumentality, said actuating means including an endless belt, connections between it and the fast pulley to move the belt in one direction when the fast pulley is in motion, and other connections between the loose pulley and the belt to move the latter in the opposite direction when the fast pulley is at rest.

27. The combination, with mechanism to effect longitudinal travel of a sheet of yarns or threads, an automatic stop-motion therefor, and a manually operated starting member, of a gassing instrumentality, including a burner extended transversely of the filamentous sheet and movable bodily in the direction of travel thereof, means operative by or through action of the stop-motion to move the gassing instrumentality away from the path of travel of the sheet, actuation of the starting member operating through said same means to move the gassing instrumentality toward the filamentous sheet, an endless actuator, means to effect travel thereof opposite to the direction of travel of the sheet when the latter is in motion, means to reverse the direction of movement of said actuator when travel of the filamentous sheet is stopped, and coupling devices, the one acting to temporarily connect the gassing instrumentality and said actuator upon actuation of the stop-motion, and the other acting upon actuation of the starting member, to thereby effect outward and return movement of said instrumentality, respectively.

28. The combination, with two separated reeds, and mechanism to effect longitudinal travel of a series of yarns or threads in the form of a flat sheet and a stop-motion to arrest travel of the sheet automatically upon breakage of an end, of a track below the reeds and parallel to the path of movement of the sheet, a carriage movable on said track and provided with a burner to act upon and gas the yarns or threads at a point near the first reed, and means acting through said track to raise and lower said burner with relation to the path of movement of the sheet, at either end of the travel of the carriage upon the track, whereby the gassing point may be changed between the reeds.

29. The combination, with mechanism, including two separated reeds, to effect longitudinal travel of a series of yarns or threads in the form of a flat sheet, of a gassing instrumentality bodily movable in the direction of the length of the filamentous sheet, to vary the position of the gassing point with relation to the reeds, automatically operating means to render inoperative said instrumentality and move it toward the outer reed when travel of the sheet is arrested, and a fixed non-conducting guard beneath the sheet at the outer reed, to protect the component yarns or threads of such

sheet when the gassing instrumentality is at rest near the said outer reed.

5 30. The combination, with mechanism, including two separated reeds, to effect longitudinal travel of a series of yarns or threads in the form of a flat sheet, and a stop-motion to arrest travel of the sheet automatically upon breakage of an end, of a gassing instrumentality below and normally adjacent the sheet, to gas simultaneously the yarns or threads thereof, normally at a point near the inner reed, and means to lower and means to move said instrumentality outward toward the outer reed, when travel of the sheet is stopped, to thereby stop the gassing action, subsequent starting of said mechanism acting through both of said means to reverse the operation thereof and thereby, by one means, raise said instrumentality into gassing position near the outer reed and then by the other of said means to move said instrumentality inward to normal position near the inner reed, the yarns or threads being subjected to the action of the gassing instrumentality during the inward movement thereof.

20 31. The combination with mechanism, including two separated reeds, to effect longitudinal travel of a series of yarns or threads in the form of a flat sheet, and a stop-motion to arrest travel of the sheet automatically upon breakage of an end, of a gassing instrumentality including a burner

below the sheet and in continuous connection with a gas-supply, a valve to regulate the flow of gas to the burner, and a carriage on which the burner is mounted, the normal position of the carriage subjecting the component yarns or threads of the sheet to the action of a gassing flame near the inner reed, an endless actuator located below and substantially parallel to the path of movement of the filamentous sheet, and moving normally opposite to travel of the latter, means to effect reverse movement of the actuator only when the sheet is at rest, separate devices to temporarily couple the carriage and the actuator whenever direction of movement of the latter is reversed, one of said devices thereby acting to move said carriage toward the outer reed when travel of the sheet is stopped and the other of said devices acting to effect return movement of the carriage when travel of the sheet is resumed, and devices successively cooperating with the gas controlling valve to partly close it when the carriage moves outward and to open said valve when the carriage moves inward.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN B. BOLTON.

Witnesses:

JOHN T. MERCER,
F. M. ANDREW.