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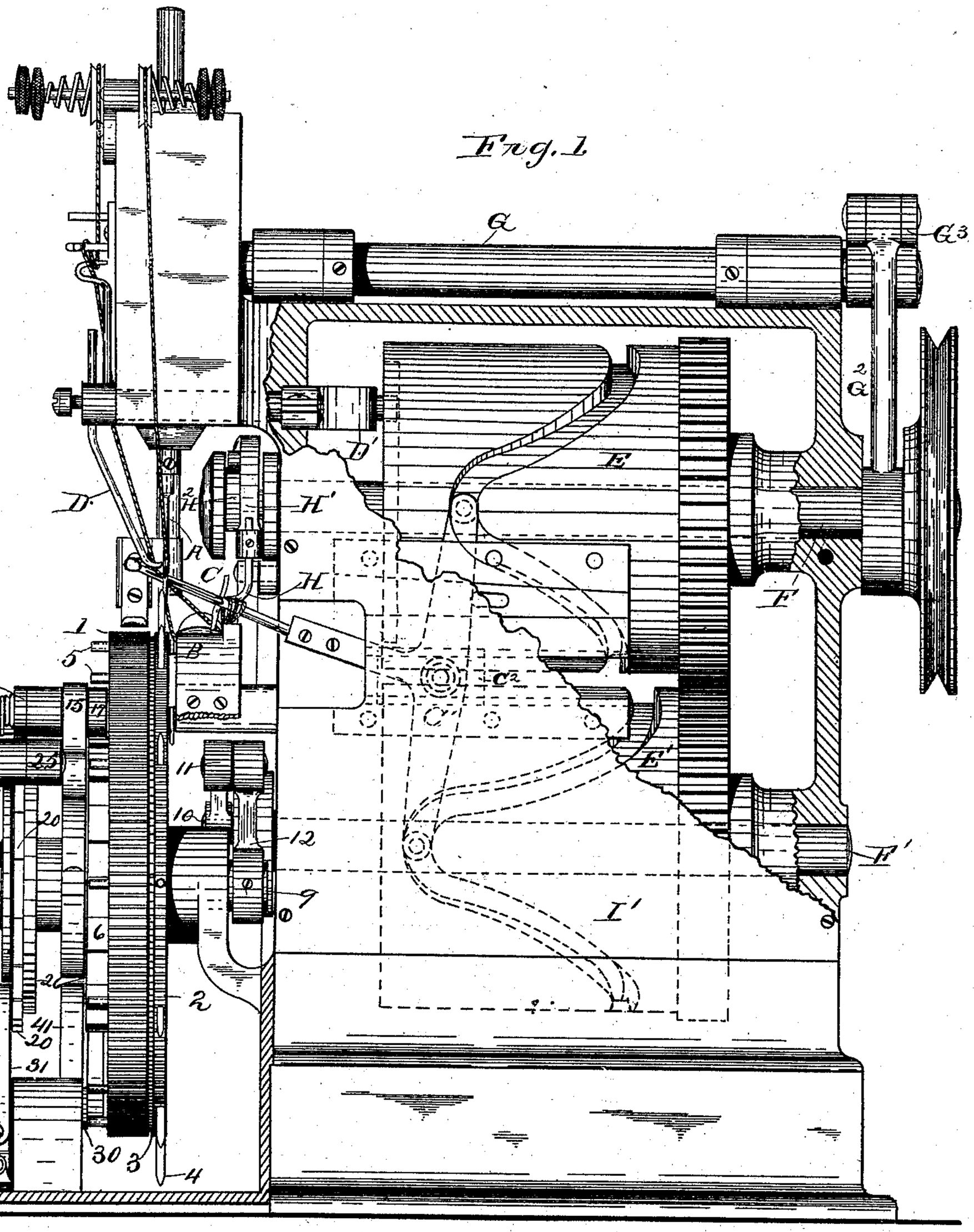
J. M. MERROW & W. H. STEDMAN.

CROCHETING MACHINE.

No. 505,275. Patented Sept. 19, 1893.

Fig. 1



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(No Model.) 4 Sheets—Sheet 2.

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Fig. 2

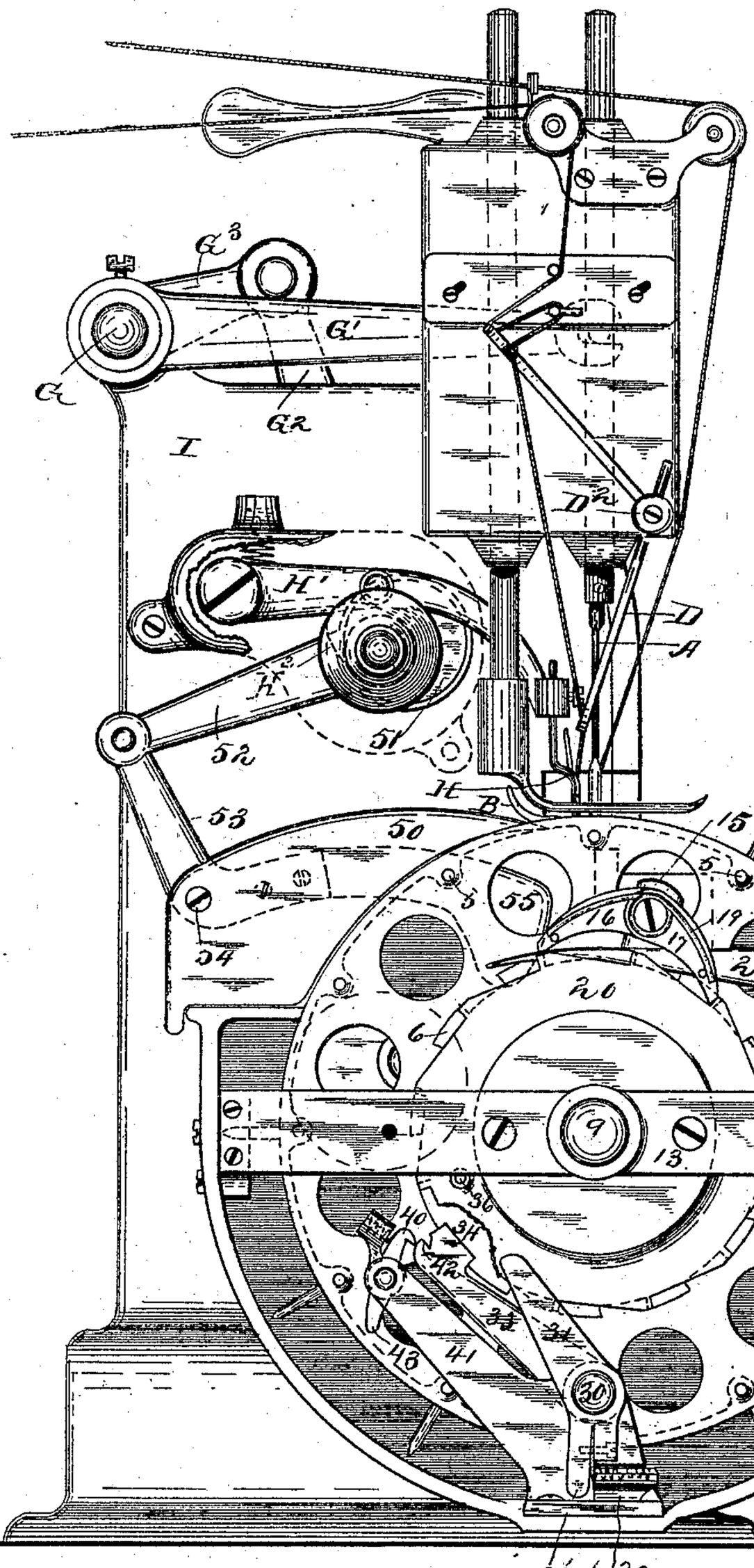
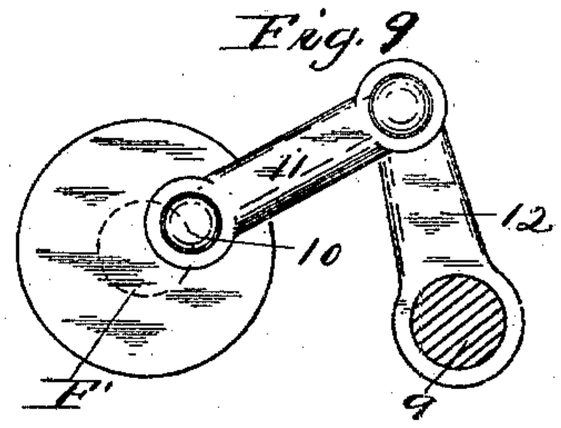


Fig. 9



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CROCHETING MACHINE.

No. 505,275. Patented Sept. 19, 1893.

Fig. 3.

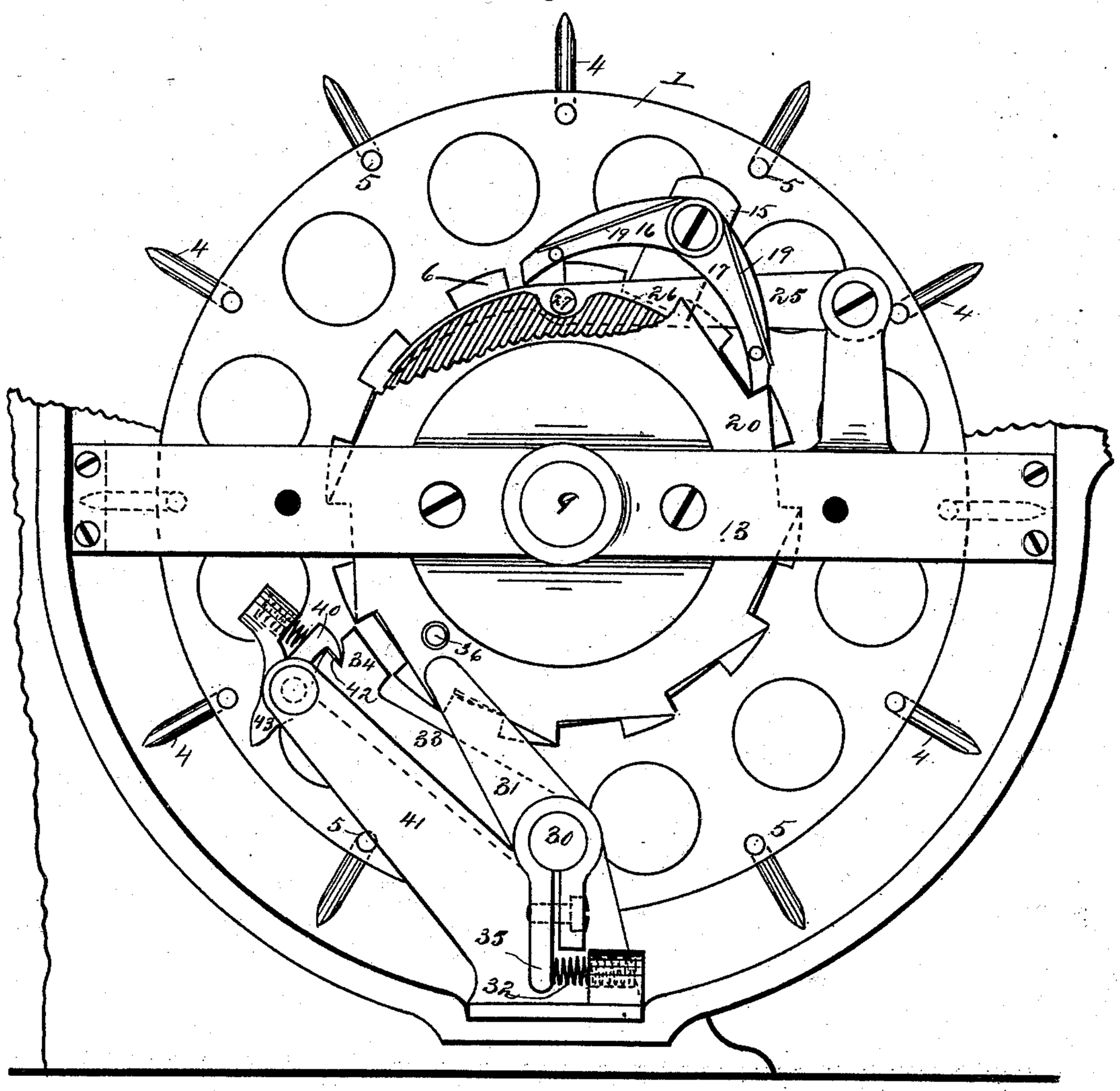

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Fig. 4

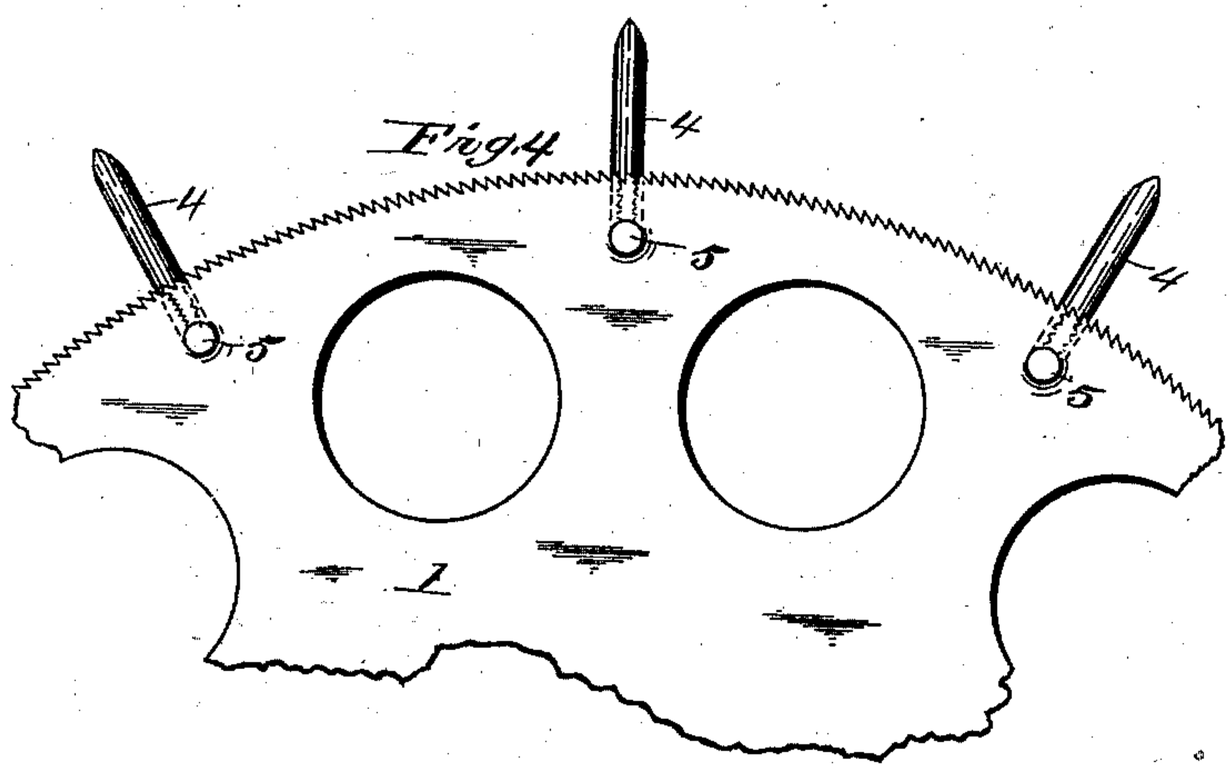


Fig. 5.

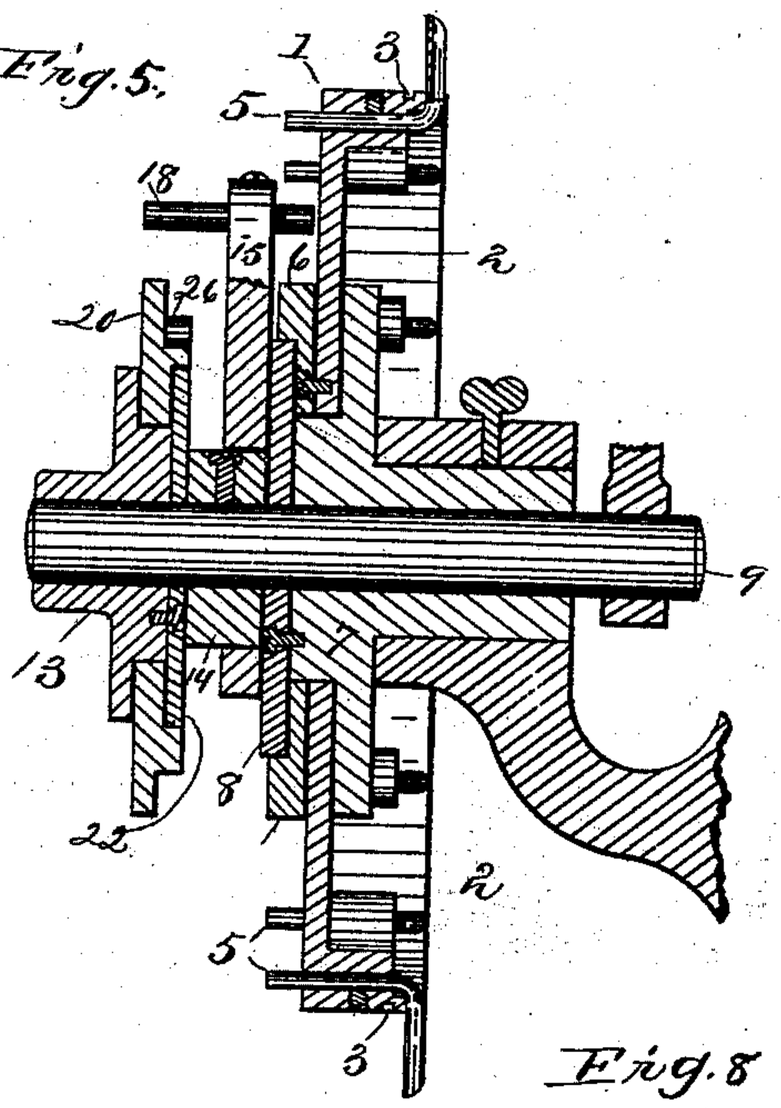


Fig. 6.

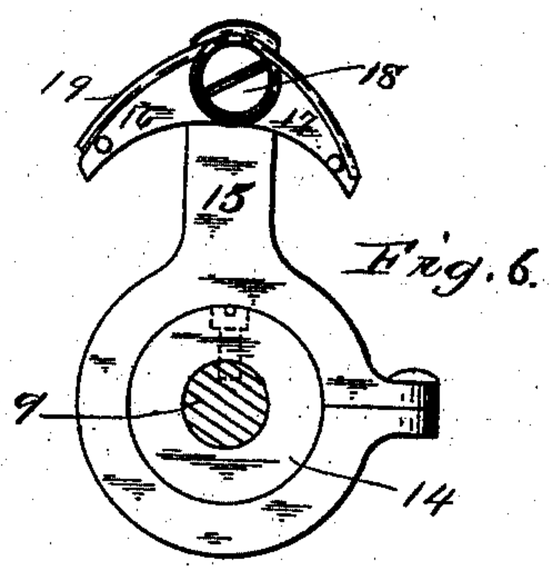


Fig. 7

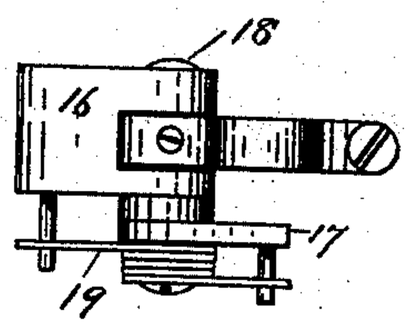
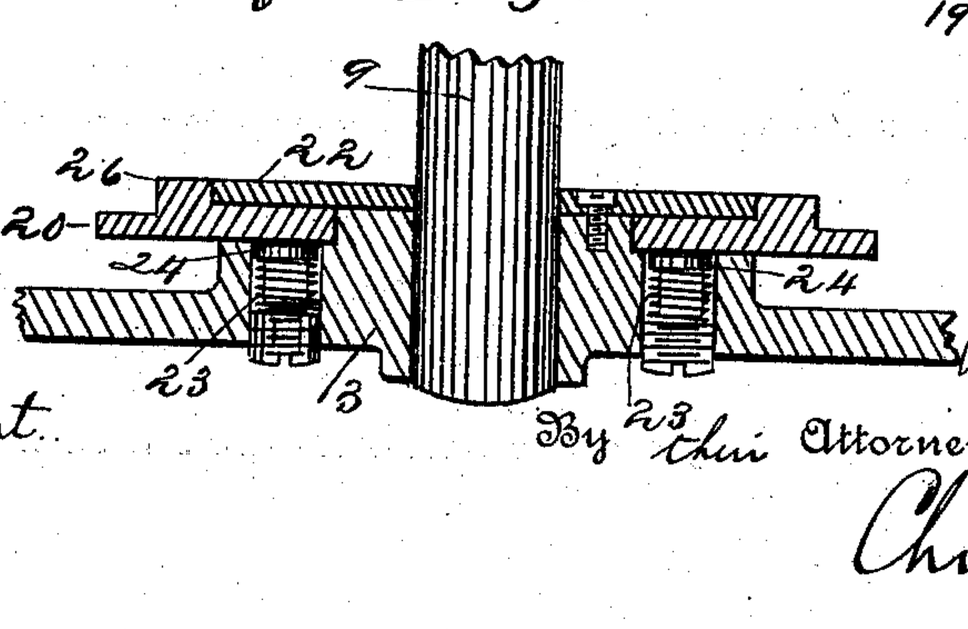


Fig. 8



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UNITED STATES PATENT OFFICE.

JOSEPH M. MERROW, OF MERROW, AND WILLIAM H. STEDMAN, OF NORWICH, CONNECTICUT; SAID STEDMAN ASSIGNOR TO SAID MERROW.

CROCHETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 505,275, dated September 19, 1893.

Application filed May 24, 1892. Serial No. 434,194. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH M. MERROW, of Merrow, in the county of Tolland, and WILLIAM H. STEDMAN, of Norwich, in the county of New London, State of Connecticut, have invented certain new and useful Improvements in Crocheting-Machines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to improvements in or upon that class of stitch-forming or sewing machines in which a thread is passed through the fabric or material and then carried beyond the edge of the latter and interlooped upon itself, either with or without a supplemental thread or threads after the manner of overseaming or crocheting machines; and it has for its object the mechanical production of a variety of fabrics, edgings, borders or finishes, many of which are new in the art of crocheting, while others are copies or imitations of productions heretofore made laboriously by hand.

In the accompanying drawings: Figure 1 is a front elevation of the machine with portions of the frame or casing broken away and in section to display the working parts. Fig. 2 is an end elevation of the machine with some of the covering plates removed or in section to disclose working parts. Fig. 3 is an end view on an enlarged scale of the feed mechanism. Fig. 4 is a detail view showing a section of the feed-wheel. Fig. 5 is a sectional view of the feed-mechanism taken in the plane of the driving shaft. Fig. 6 is a side elevation of the pawl-carrier and pawls. Fig. 7 is a top view of pawls and carrier. Fig. 8 is a sectional view of the timing ratchet and connected parts. Fig. 9 is an elevation of the devices for actuating the feeding devices.

Similar letters and figures of reference in the several views indicate the same parts.

In illustrating the preferred embodiment of our present invention we have shown it as applied to a modified and improved form of the well known Merrow crochet machine, the construction and mode of operation of which are set forth in Patents Nos. 414,234 and 414,718, dated respectively November 5, 1889, and November 12, 1889, and in application, Serial No. 418,592, filed January 19, 1892, although, as will be apparent, certain of the novel features are applicable to other kinds and forms of sewing machines.

The stitch forming mechanism of the machine shown includes a reciprocating eye pointed needle A, a finger plate B around which stitches are formed, and a crochet hook or looper C, reciprocating alternately above and below the finger plate, to grasp the needle thread and interloop the loops formed therefrom, in a manner well known. The auxiliary features of said mechanism, are the reciprocating thread carrier D, the loop holding finger H, the requisite tension and take up devices for the threads and a feeding mechanism.

The crochet hook C is secured to the hook-carrier C′, pivotally supported upon a block C^2 sliding in guides, and receiving the requisite reciprocating and oscillating motions through the conjoint action of the two cam cylinders E, E′, the latter being secured to their respective shafts F F′, and connected by gears or otherwise to rotate in unison.

The reciprocating motions of the needle are produced through the agency of a rock-shaft G, carrying a slotted arm G′ engaging a pin on the needle bar, said rock shaft receiving motion from an eccentric on the driving shaft F (the driving pulley being attached to said shaft) through a pitman G^2 connected to arm G^3 on the rock-shaft.

The thread carrier D, (which is only brought into action when a supplemental thread is to be introduced into the finish) is vibrated, to present the supplemental thread to the hook, by means of a cam on the end of cam-cylinder, E, operating through an arm D′, to rock the shaft D^2 to which said carrier is adjustably secured. Loop holding finger H (which is interposed to engage the supplemental thread, after a stitch has been completed, and operates to hold a loop thereof while the next succeeding stitch involving the supplemental thread is being formed) is adjustably secured to a pivoted support H′ and actuated by a cam H^2 on the end of shaft F. The loop hold-

ing finger, besides operating to hold a loop or bight of the supplemental thread, serves to hold the loops upon the crochet-hook as the latter is advanced above the finger plate to engage the needle-thread, as shown in Fig. 1.

The cam cylinders E E′ are inclosed and concealed within the housing or casing I and the guides or ways for block C^2, supporting the hook-carrier C′, are attached to the front movable section or door I′ of said housing, so that said parts can readily be removed for inspection and repair.

The feeding mechanism comprises a wheel 1 having an overhanging or crowning flange 2, preferably serrated or toothed upon its periphery, and divided by a narrow circumferential groove 3. Projecting radially from the wheel is a series of pins 4 (preferably grooved longitudinally and set in or on the inner end of the flange 2 so that the needle may reciprocate close to or within the pins) and these pins may be formed with shanks, bent at an angle as shown, the ends 5 projecting beyond the web of the wheel, to serve a purpose hereinafter to be explained.

Upon one side of the feed-wheel 1 is formed or secured (preferably the latter) a ratchet or notched wheel 6 provided with notches presenting angles or shoulders on opposite sides, and said wheels (ratchet and feed) are supported to rotate upon a flanged or collared bushing 7 detachably secured to the frame and provided with a collar 8 for sustaining the wheels in place upon said bushing, at the same time providing for their ready removal, while the removability of the bushing from the frame permits the removal of the feeding devices. The bushing 7 is bored out to form a bearing for and permit the passage of a shaft 9, which latter controls the operation of the feeding devices, said shaft receiving an oscillatory motion from a crank 10 on shaft F′ of lower cam cylinder, through pitman 11 and arm 12. The outer end of shaft 9 is supported in a detachable bearing 13, so that, by the removal of said bearing and the unfastening of the bushing, the feed wheel and connected parts can be withdrawn.

To the shaft 9 is secured a collar 14, and upon the latter is tightly clamped an arm or pawl-carrier 15 whose upper or free end is provided with two reversed pawls 16, 17. The pawl-carrier is attached to the shaft or the collar thereon by a frictional clamp, powerful enough to resist or sustain the pressure and shocks to which it is subjected when properly adjusted and clamped, but capable of yielding in case of unusual resistance. The two pawls 16 and 17, mounted upon the carrier, are for convenience supported upon a cross pin 18; and one of said pawls —16— is wider than the other, and projects on opposite sides of the carrier, as shown in Figs. 6 and 7, its end overlying the feed ratchet 6 on one side and the pawl guard 25 on the other. A single spring 19 may be employed for holding both pawls to the work, said spring being located and held upon the pin forming the pivotal support for the pawls, with its ends engaging the latter, as shown.

Beyond or outside of the pawl carrier is arranged what we have designated a timing ratchet 20 with the teeth of which pawl 17 is arranged to co-operate, while pawl 16 engages the teeth of ratchet wheel 6. The timing ratchet is supported to rotate upon a flange or collar on cross bar or bearing 13 in which the outer end of shaft 9 has its bearing, and said ratchet plate is held in place by a disk or collar 22. As, during the operation of the device, it is desirable that the timing ratchet should not be permitted to "race" or run ahead of the impelling pawl, and that it should be held stationary during the return or inoperative stroke of said pawl, a brake or other restraining device is applied thereto; in the present instance these functions are performed by friction plates 24 held by adjustable springs 23 against the face of the timing ratchet, and operating, by their frictional contact, to restrain the movement of the ratchet wheel when not being advanced by its pawl 17. The two pawls 16 and 17, being reversed and engaging the ratchet wheel 6 on the feed wheel and the timing ratchet 20, respectively, if not otherwise controlled they would operate, at each reciprocation of the pawl carrier, to advance their respective ratchet wheels one or more teeth, the two wheels moving in opposite directions. As, however, one of the principal objects of our present invention is to provide a feed-mechanism which will remain stationary during a series of stitch forming operations and be actuated, to advance the material, at intervals only, and inasmuch as the pawl carrier is arranged to be reciprocated once for each complete operation of the stitch forming devices, means have been provided for periodically interrupting or suspending the action of the feed-operating pawl 16 during any desired number of reciprocations of the pawl carrier; and it is for the purpose of effecting the automatic engagement and disengagement of said pawl with the ratchet wheel 6 that the timing ratchet is employed. The means shown for thus automatically controlling the periods of the feeding motion through the agency of the timing ratchet and feeding pawl 16, consist of a cam 26 formed upon the side of or connected to rotate with the timing ratchet 20, and a pawl guard or switch 25, the latter operating to lift and hold the pawl 16 out of engagement with the teeth of ratchet wheel 6 during one or more reciprocations of the pawl carrier, and, at proper intervals, to effect the engagement of said pawl with its ratchet wheel, and thus produce a feed motion.

The pawl guard or switch 25 is shown located to one side of the pawl carrier and beneath the pawl 16, and it carries a pin 27 riding upon the cam 26. The pawl guard is pivoted upon bar 13 or other suitable part of the

frames and cam 26 is furnished with one or more depressed portions into which pin 27 enters, to retract the pawl guard and permit pawl 16 to engage the teeth of ratchet wheel 6. At all other times the pin, riding on the more elevated or prominent portions of the cam, holds the pawl guard elevated, thereby lifting the end of the pawl and sustaining it above and clear of the ratchet wheel 6, so that, as the pawl carrier reciprocates, the pawl will ride freely upon the pawl guard without engaging the ratchet wheel 6, which latter together with the attached feed wheel will remain stationary, until the timing ratchet, which continues to advance, shall bring one of the depressions in the cam opposite the pin on pawl guard, when the pawl will again be brought into operative engagement with its ratchet wheel and another feed motion will be produced. It will be seen that the intervals occurring between successive feed motions depend upon the number and location of the depressions in the cam driven by the timing ratchet, and that the length or extent of feed motion is determined by the throw of the pawl carrier and the proportions of the parts.

Practice has demonstrated that unless the motion of the feed wheel is very slow it is almost sure to be carried, by momentum, beyond the point at which the pawl 16 would carry it in a single forward movement, in other words, it is liable to race ahead and thus destroy or interfere with the regular and determinate action required. This defective action is the more objectionable in a machine of the kind shown, wherein it is provided that, at each forward motion of the feed, one of the pins or points 4 shall be held in such relation to the needle that the latter will pass down into the groove in the face of said pin. Hence it has become necessary to supply locking mechanism for arresting and holding the feed wheel in position at the termination of each step or partial rotation; and to effect this, as well as to insure the retention of the feed wheel in proper position at other times when not being acted upon by the feeding pawl 16, we have devised and applied the following locking mechanism.

Within the feed case is mounted a rock shaft 30 carrying at one end an arm 31 to which a spring 32 may be applied, and at the other end carrying a locking pawl 33 having an angular tooth or projection 34 adapted to fit the spaces between the teeth on the feed ratchet wheel 6. The lever or arm 31 is adjustably held by a compression or clamping connection upon the rock shaft, and is provided with a projecting portion 35 against which the compression spring bears, said spring exerting pressure in a direction to force the pawl 33 into engagement with ratchet wheel 6.

Upon the timing ratchet 20 is mounted a pin or projection 36 in position to engage the arm 31 and raise the pawl 33 out of engagement with ratchet wheel 6. The projection 36 on timing ratchet is so located relatively to the depression in the cam, that it will engage the lever and lift pawl 33 out of the feed ratchet wheel at the time or slightly before the depression in the cam causes the retraction of the pawl guard, and thus leave the feed wheel free to be advanced. As, however, the timing ratchet is advanced and set during the back motion of the feed pawl 16 and in advance of its engagement with the feeding ratchet 6, if the projection 36 passes off from the arm 31, the pawl 33 would at once return and lock the feed wheel, but this is prevented by trigger 40. The trigger is pivoted to an arm 41 (for convenience formed integral with the support for rock shaft) and is acted upon by a spring to carry its hooked end over a shoulder 42 on the locking pawl 33. The end 43 of the trigger projects into the path of the pins 5 carried by the feed wheel. When the locking pawl has been retracted it will be engaged and held by the trigger until, by the forward motion of the feed-wheel, one of the pins 5 engages and trips the trigger, when the locking pawl will be released and swung into engagement with the feed ratchet wheel 6. The pins 5 are arranged to engage and trip the trigger before completion of the forward motion of the feed wheel under the influence of feed pawl 16, and said pins cannot pass the trigger until they have swung it back sufficiently to insure the release of the locking pawl. The pin 36 is preferably so located upon the timing ratchet 20 as to deflect arm 31 and throw the locking pawl out of engagement with the feed ratchet wheel near the latter end of the movement of the pawl carrier in the direction to effect an advance of the timing ratchet, in order that the feed wheel may remain locked in position as much of the time as possible.

When the feed wheel is locked, as shown in Fig. 2, it remains so until, by the intermitting advance movement of the timing ratchet, the unlocking pin 36 deflects lever 31 sufficiently to raise the locking pawl until it is engaged by the trigger, as shown in Fig. 3, at which time the pawl guard is in its lowest position, its pin resting in a depression in the cam, so that upon the next advance of the pawl carrier, pawl 16 will engage the feed ratchet wheel 6 and advance the feed wheel one step. While the feed wheel is advancing, one of the pins 5 trips the trigger in passing, so that the locking pawl will be disengaged and forced into the next notch in ratchet wheel 6, where it will remain until disengaged by the contact of unlocking pin 36 with arm 31. After the advance or feed motion has been completed and the feed wheel locked in position, the return or retraction of the pawl-carrier advances the timing ratchet one step, thus elevating the pawl guard and raising the pawl 16 from engagement with the feed ratchet wheel 6, where it is maintained during the time required for advancing the tim-

ing ratchet, step by step, until the pin 36 again engages arm 31 to unlock the feed wheel and the depression in the cam permits the pawl guard to be depressed, preliminary to the next advance of the feed wheel.

Any desired number of unlocking pins 36 and corresponding depressions in the cam surface may be employed with the timing ratchet, to cause the feeding at the desired times, and when it is desired to feed once during every complete reciprocation of the needle, the pawl guard may be dispensed with and an unlocking pin 36 provided for each tooth of the timing ratchet. It is of course understood that the fabric, if it be of knit, crocheted or other loose open material is to be placed or impaled upon the pins projecting from the feed wheel but in commencing an article, such as solid crochet work, it is necessary to have a cord, chain or other suitable material placed upon the pins to form a foundation upon which to build the first row of crochet stitches.

The feeding is mainly accomplished by the engagement of the pins with the fabric, but in order to insure the proper advance of intermediate portions, to prevent dragging and distortion, the serrated surface of the feed wheel is provided for advancing the material, in which case the pins are employed mainly, to locate and determine the points at which the stitches shall be incorporated in or attached to the fabric. As the fabric is fed along it must be removed from the pins by hand or otherwise, and to accomplish this automatically a fabric guide 50 is arranged in rear of the presser foot with its pointed end running in the groove in feed wheel; but in some cases this fabric guide is found insufficient to effect the removal of the material from the pins; hence the machine is provided with other or additional means for the purpose.

An eccentric 51 on the shaft F is connected by pitman 52 with a lever 53 pivoted to the frame, as at 54. The front or free end of the lever 53 is furnished with a thin flat piece 55 called the fabric cast-off, working along side the inner end or face of the feed wheel, and which, as it is oscillated, operates to raise the fabric from off the pins. The fabric cast off is preferably adjusted to rise as the fabric is fed, and to engage the loop projecting beyond the edge of the feed wheel, thus raising said loops with the fabric off from the pins of the feed wheel; and when said fabric cast off is employed in conjunction with a fabric guide 50 working on opposite sides of the pins, the removal of the fabric is insured. When several stitches are made in one place, that is with the feed wheel stationary, the fabric cast off will perform a number of useless vibrations, but the mechanism is preferable in this machine to such as would operate only at certain times.

To facilitate the removal or shedding of the loops or fabric from the points on the feed wheel, the finger plate which is curved to conform to the circumference of the feed-wheel, has its end bent in a reverse curve or upward.

Having thus described our invention, what we claim as new is—

1. In a crotchet or overseaming machine, the combination, with the stitch forming devices and a finger around which the stitches are formed, a feed wheel provided with a serrated or roughened holding and feeding surface and a series of pins or points for impaling the fabric; substantially as described.

2. In combination with the stitch forming mechanism of an overseaming or crochet machine, a fabric feeding mechanism provided with a feed-wheel having impaling points or pins, a fabric guard projecting on one side of the impaling pins, and a fabric cast off reciprocating on the opposite side of said pins; substantially as described.

3. In combination with the feed wheel and its ratchet wheel; a timing ratchet wheel; a pawl-carrier provided with reversed pawls, one for the feed and the other for the timing ratchet wheel; a pawl-guard for the feed pawl; and a cam actuating said pawl guard and deriving motion from the timing ratchet; substantially as described.

4. In combination with the feed ratchet wheel, timing ratchet wheel and the actuating pawls therefor driven in unison, the pawl guard, the cam actuating the pawl-guard and driven from the timing ratchet, the locking pawl and the disengaging pin also driven by the timing ratchet and operating to unlock the feed ratchet wheel; substantially as described.

5. In combination with the feed ratchet wheel; timing ratchet wheel; reversed actuating pawls mounted upon a common pawl carrier; pawl guard; cam driven by timing ratchet and actuating pawl-guard; locking pawl; tripping pin on timing ratchet for disengaging locking pawl; and trigger engaging locking pawl; substantially as described.

6. In combination with feed ratchet wheel; timing ratchet wheel; actuating pawls for said ratchet wheels; locking pawl; tripping pin on timing ratchet wheel for releasing locking pawl; trigger engaging locking pawl; and tripping pins for disengaging said trigger; substantially as described.

7. In combination with feed wheel provided with impaling pins; feed ratchet wheel; timing ratchet wheel; actuating pawls for said ratchet wheels; locking pawl for feed wheel; trigger engaging locking pawl when elevated; and a series of pins, equal in number to the impaling points on feed wheel, arranged to engage and trip trigger to release locking dog before termination of feed movement, substantially as described.

8. In combination with feed wheel provided with trigger operating pins and ratchet wheel; timing ratchet wheel provided with cam and actuating pin for locking pawl; a pawl for each of said ratchet wheels; a pawl

guard for feed operating pawl; a locking pawl for feed ratchet wheel; and a trigger engaging locking pawl, substantially as described.

9. In combination with the feeding devices the feed ratchet wheel and its pawl and the timing ratchet and its pawl; the pawl guard and friction brake applied to the timing ratchet wheel; substantially as described.

10. In combination with the feed wheel provided with a ratchet, the rock shaft, and the pawl carrier secured to said shaft by a frictional clamp; substantially as described.

11. In combination with the feed wheel and its ratchet wheel mounted upon a bushing; a feed actuating shaft journaled in said bushing and provided with a pawl carrier; a pawl mounted upon said carrier and engaging the feed ratchet wheel; on the forward stroke of the carrier, a timing ratchet; a second pawl mounted upon the carrier and engaging said timing ratchet on the back or return stroke of the carrier; a locking pawl for engaging the feed ratchet wheels mounted upon a rock shaft having an arm projecting in the path of a pin on the timing ratchet; a trigger engaging said locking pawl when elevated by the timing ratchet wheel; and a pin on the feed wheel arranged to engage and pass the trigger; and operating to release the locking pawl during the advance motion of the feed wheel; substantially as described.

12. In combination with the stitch forming mechanism, comprising a reciprocating needle, a reciprocating and oscillating hook and a finger to form and support the stitches beyond the edge of the fabric; a feed wheel provided with impaling points; a fabric guard; a fabric cast off; and actuating mechanism controlling the advance movements of the feed wheel with relation to the number of stitch forming operations, said mechanism comprising a rock shaft driven in unison with the needle and carrying the impelling devices for the feed wheel, a timing ratchet wheel with devices controlling the application of said impelling devices, and a locking device for arresting the movement of the feed wheel, said locking devices being released by the action of the timing ratchet and engaged by the feed motion of the feed wheel; substantially as described.

13. The combination, in a machine, such as described, with the stitch forming mechanism, of a feeding mechanism comprising a rotating member, such as a wheel; actuating devices for advancing said wheel intermittingly; a lock actuated to interrupt and hold said rotating member, to prevent overthrowing or displacement; and unlocking mechanism operating through the lock to release the rotating member or feed wheel preparatory to the next feed motion, substantially as described.

14. In a crocheting machine, the combination of a feed-wheel and its support; a ratchet wheel secured to the feed wheel; a continuously reciprocating feeding pawl; a pawl guard; a lock arresting the throw of the feed wheel and retaining the latter in position; a cam governing the position of the pawl guard; and a lock retracting pin; substantially as described.

15. The combination with a feed-wheel, and actuating mechanism for effecting intermittent movements of said wheel, of a locking pawl actuated to arrest the feed wheel at the end of each feed-movement and to positively retain said wheel against further movement either forward or backward in the intervals between successive feed-motions; substantially as described.

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