

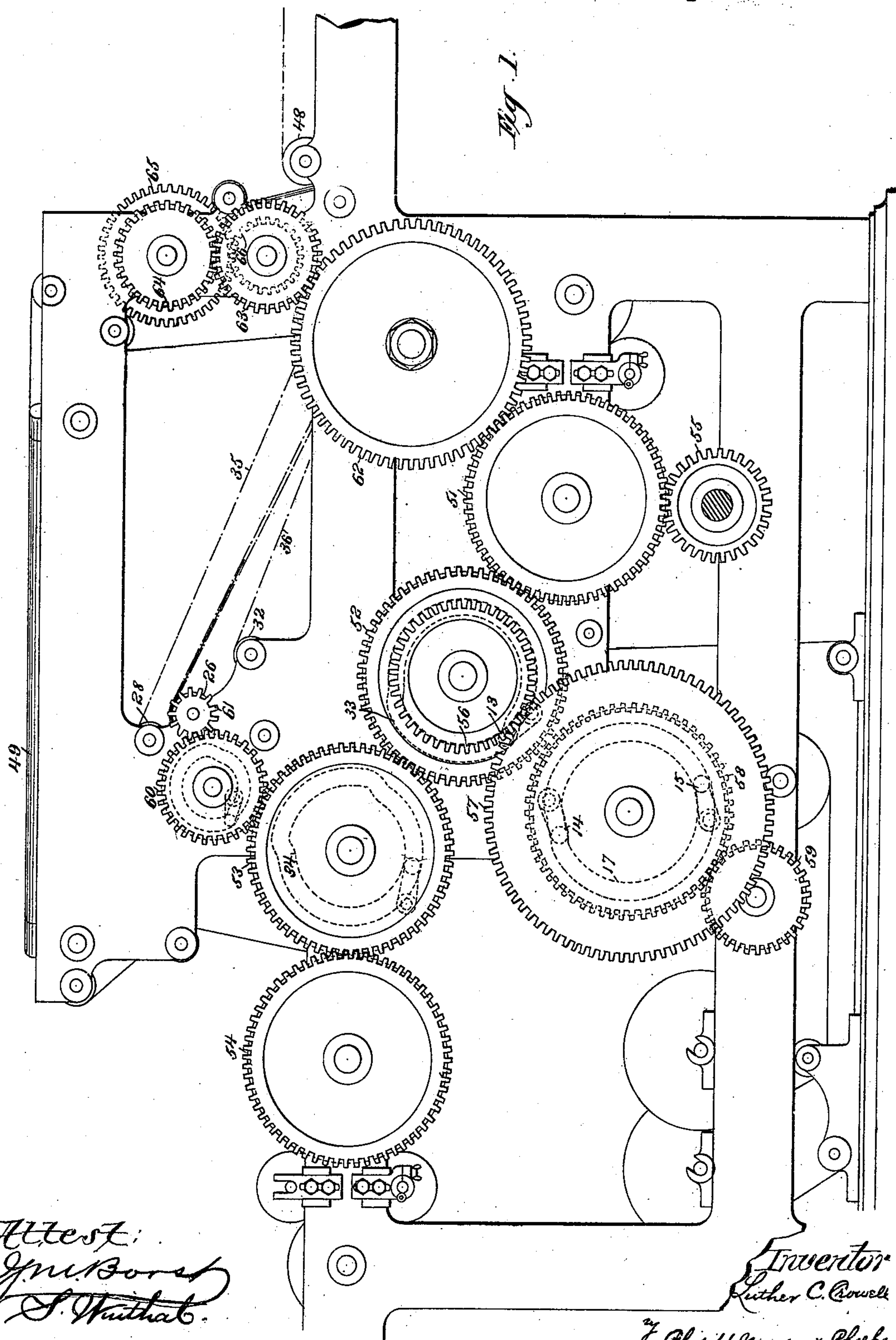
(No Model.)

4 Sheets—Sheet 1.

L. C. CROWELL.
MECHANISM FOR ASSOCIATING SHEETS.

No. 545,459.

Patented Sept. 3, 1895.



Attest:
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S. Whitcomb.

Inventor
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(No Model.)

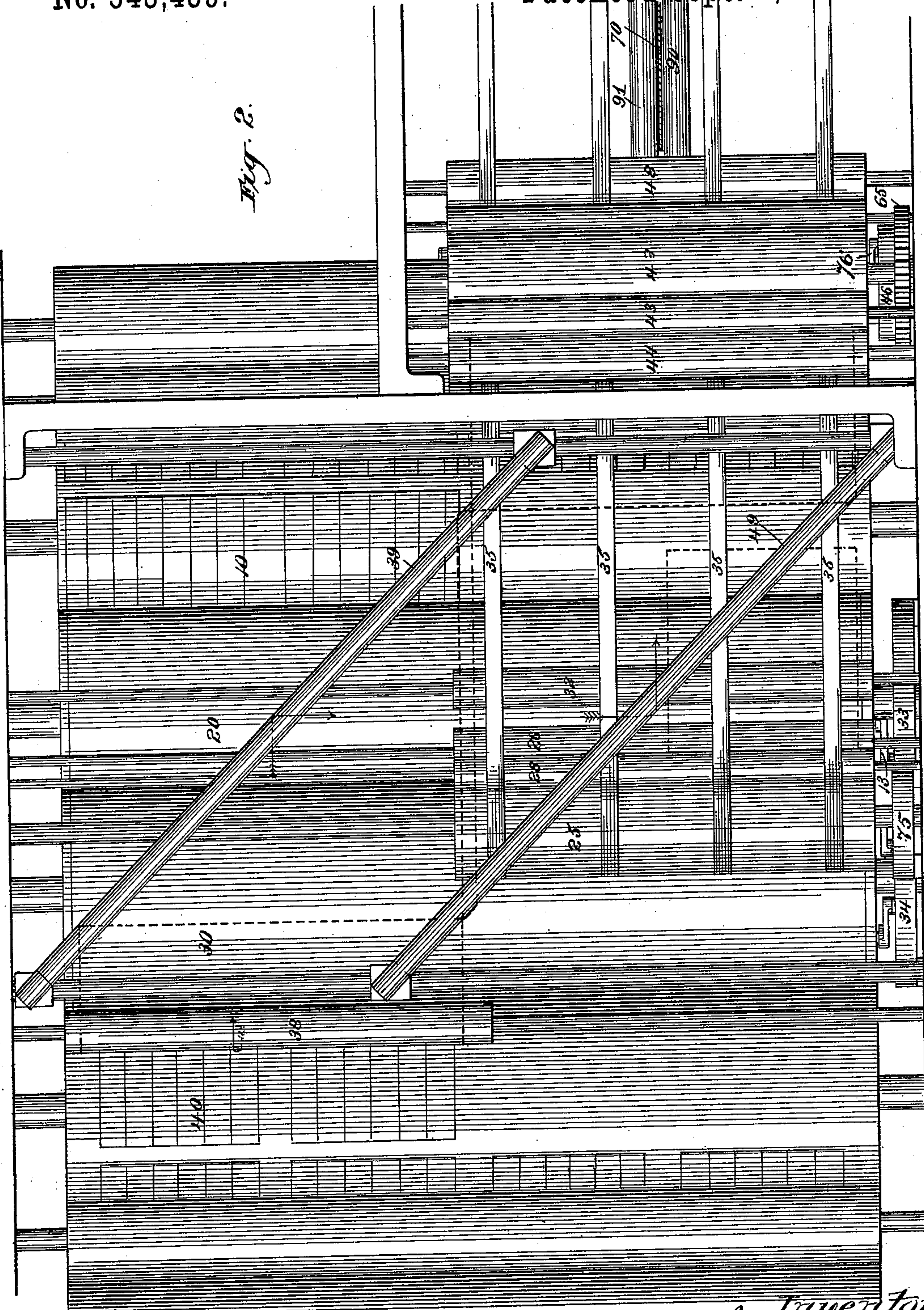
4 Sheets—Sheet 2.

L. C. CROWELL.
MECHANISM FOR ASSOCIATING SHEETS.

No. 545,459.

Patented Sept. 3, 1895.

Fig. 2.



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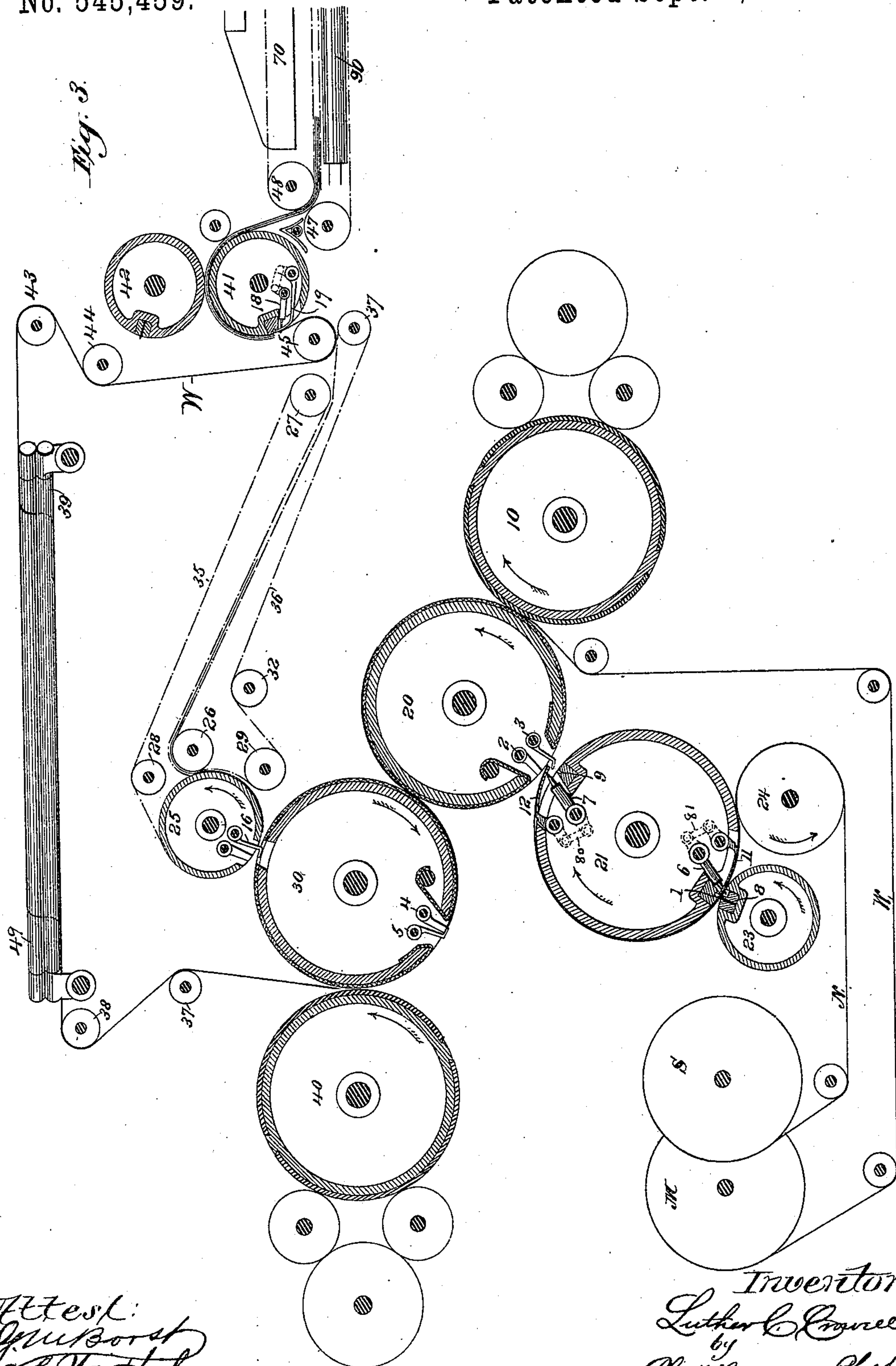
(No Model.)

4 Sheets—Sheet 3.

L. C. CROWELL.
MECHANISM FOR ASSOCIATING SHEETS.

No. 545,459.

Patented Sept. 3, 1895.



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4 Sheets—Sheet 4.

L. C. CROWELL.
MECHANISM FOR ASSOCIATING SHEETS.

No. 545,459.

Patented Sept. 3, 1895.

Fig. 4.

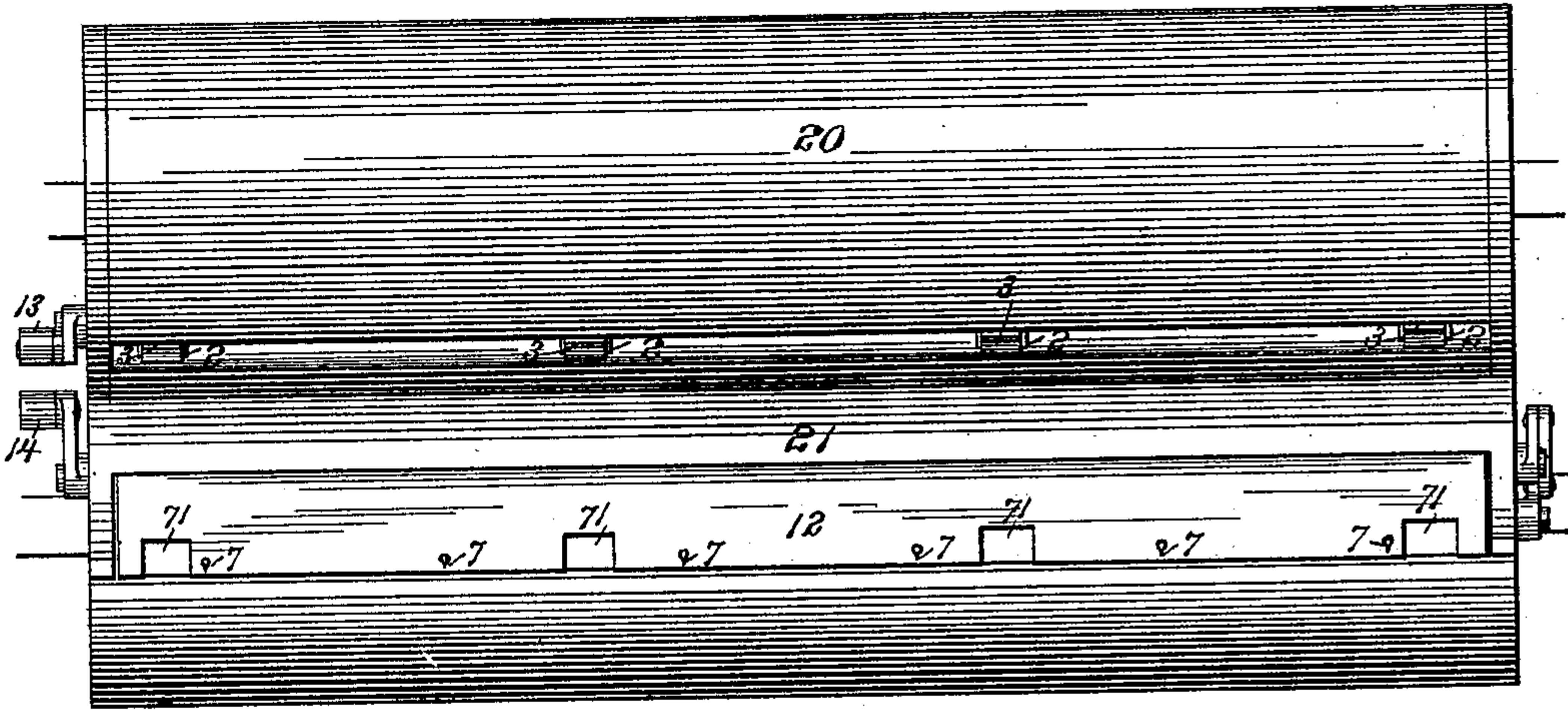
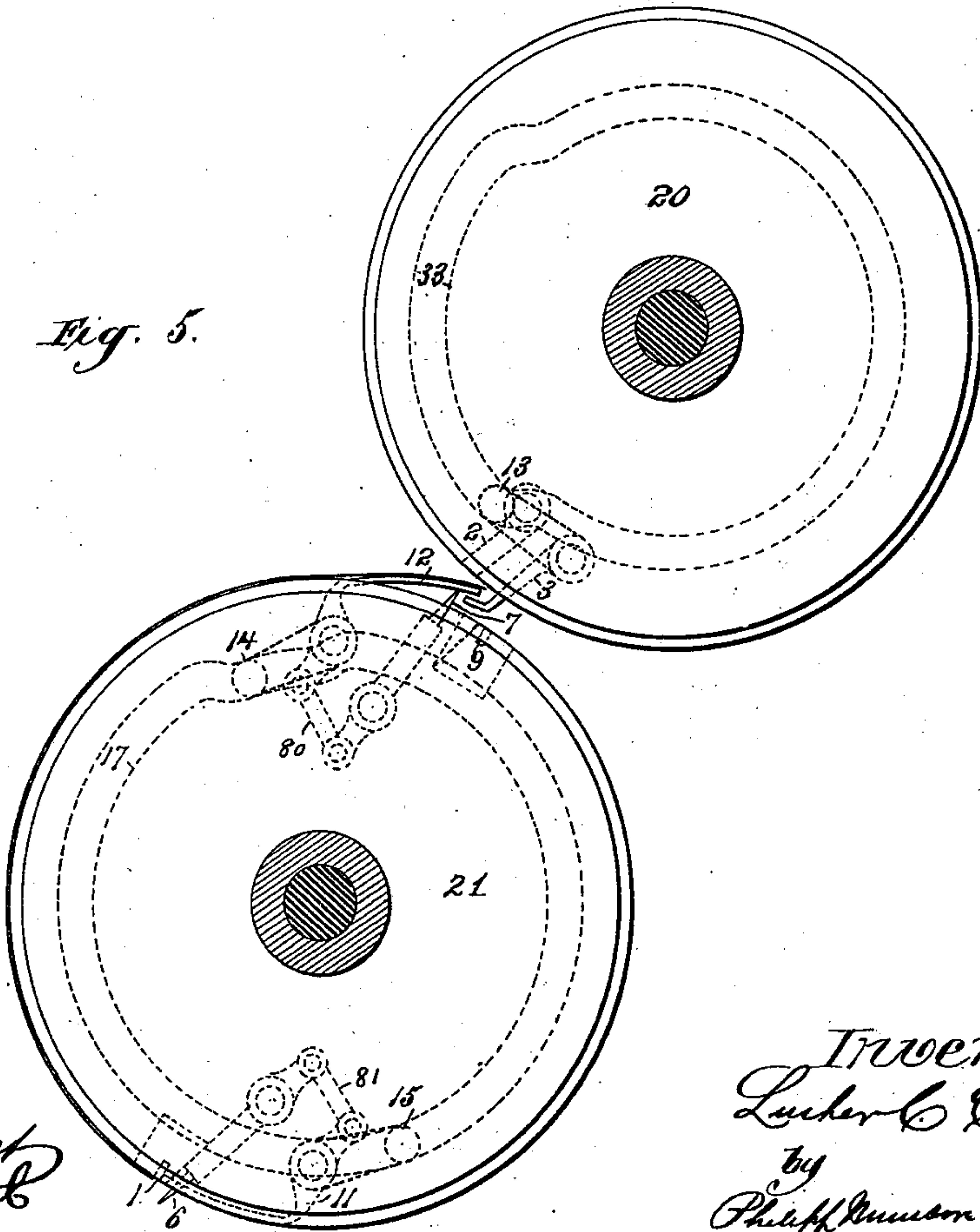


Fig. 5.



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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

MECHANISM FOR ASSOCIATING SHEETS.

SPECIFICATION forming part of Letters Patent No. 545,459, dated September 3, 1895.

Application filed October 1, 1892. Serial No. 447,503. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Mechanism for Associating Sheets, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to means for associating small or supplemental sheet lengths with large or main sheet lengths in the production of a compound product which may not be composed by simply bringing together a number of the aforesaid main sheet lengths; and although these improvements may be otherwise usefully employed, they are especially advantageous in printing-machines for the production of newspapers, where the product at times is required to be made up of such a number of pages as renders it necessary to combine a small sheet, as one having, say, two or four printed pages, with a large sheet, as one having, say, four, eight, or twelve pages, as forming, say, a six, ten, twelve, or fourteen page product.

The invention principally consists in combining with a receiving-cylinder running at the high speed necessary to the manipulation of the main sheet lengths a carrying-cylinder running at a relatively slower speed, adapting it to the manipulation of small or supplemental sheets, with which latter cylinder are combined means for severing a supplemental web into such sheets, and for delivering them from the carrying-cylinder to the receiving-cylinder, by which organization small or supplemental sheets are carried forward at one speed of onward movement and delivered to the receiving-cylinder into association with the main sheet length carried thereby, thereafter traveling concertedly with the main sheet length and being simultaneously treated therewith, as by printing.

The invention also includes various combinations of parts, fully hereinafter pointed out and claimed.

A practical embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, Fig. 2 a plan

view, and Fig. 3 a sectional elevation, of a printing-machine containing the present improvements, while Fig. 4 is an elevation of the principal cylinders of the associating mechanism detached from the printing-machine, of which Fig. 5 is an enlarged end elevation.

The principal elements of this improved sheet-associating mechanism are a cylinder 21 for carrying small or supplemental sheets, a cylinder 20 for receiving the said sheets, as well as the large or main sheet lengths, and a cutting mechanism for dividing a web into the small sheets carried by the cylinder 21. The carrying-cylinder 21 is suitably mounted in bearings and provided with means for rotating it at a speed that is appropriate to the size of the sheet it is to carry and deliver to the cylinder 20. In the instance shown this sheet is a page length and equal to half the circumferential extent of the cylinder 20, and hence the surface speed of this cylinder will be one-half that of the cylinder 20. Although the cylinder 21 might be of a size to carry one such sheet only, it is preferred to make it of double size, as shown. It is provided with one or two sets, as may be required, according to its size and consequent number of sheets it is to carry, of sheet holding, carrying, and releasing devices, which, as illustrated, are impaling-pins, as 6 7. Behind the line occupied by each set of these pins is arranged a vibrating throw-off plate, as 11 12, which might be series of arms, if desired. These arms or plates are pivoted to the cylinder and arranged to lie, when closed, in recesses therein, so as to be coincident with the peripheral face of the cylinder, and they are vibrated outward at suitable times, so that they will lift the head of each sheet off from the pins and press its leading edge outward by means of rock-arms, as 14 15, the studs or bowls of which run in the groove 17 of a cam fixed to the side frame, which groove is so shaped as to move said plates quickly outward as they approach their meeting-point with the grippers 3, and in like manner withdraw them into their recessed seats coincident with the periphery of said cylinder when their office has been performed.

The sheet-holding pins, as 6 7, might be sta-

tionary and simply project a suitable distance beyond the facial surface of the cylinder 21, so as to properly pierce the leading end of each sheet, suitable holes being provided for their passage through the plates 11 12. As herein shown, these pipes project through recesses in the shell of the cylinder 21 and normally protrude through small holes in the plates 11 12. They are carried by rock-shafts, which, by means of a rock-arm and a link, as 80 or 81, are so connected with a rock-arm on the shaft of the throw-off plates 11 or 12 as to move concertedly therewith, the relative co-operation of each plate and set of pins being such that the pins rock slightly rearward as the plate moves outward, and thus accomplish a smooth withdrawal of the sheet from the pins. The pins might, however, be made to reciprocate, and thus be alternately protruded to engage the sheet and withdrawn to release it. Slightly in advance of the said pins this cylinder is also provided with cutting-grooves 1 9, with which a cutting-blade 8 coacts to sever or partially sever a web of paper into sheets. This blade 8 is carried by a cylinder 23, that is arranged in co-operative relation to the cylinder 21 and geared to run at a uniform speed therewith. These cutting devices will preferably operate to completely sever the web, although it is practical for such web to be so partially severed as to remain but slightly attached at the points of division between the sheets to be formed from it. The receiving-cylinder 20, co-operating with this carrying-cylinder 21, is suitably mounted in bearings, and, as shown, is provided with means for rotating it at such surface speed as is appropriate to the manipulation of a main web, which is ultimately to be severed into sheet lengths, forming the principal part of the desired product, its circumferential extent being of the length of two pages. In this instance the cylinder 20 is geared to run at twice the surface speed of the cylinder 21; but this may be varied under suitable circumstances. This cylinder is provided with sheet receiving, retaining, and releasing devices—such, for instance, as grippers 3—that are vibrated in any common manner, and which co-operate with bearers 2 to receive a sheet pressed outward by the throw-off plate 11 or 12 from the cylinder 21, clamp the same on and carry it around upon the cylinder 20, which grippers in their return movement to reach a position for engaging the sheet pass through recesses 71, with which the plates 11 12 are provided. It will now be understood that a web of paper, as N, led from a supply-roll, as S, passed around a feeding-roller, as 24, and entered between its surface and that of the cylinder 21, will be impaled by the pins 6 or 7, and thus be held to and carried around upon the surface of that cylinder, and that as the point of coaction of the cutting-blade 8 and cutting-groove 1 or 9 is passed the web will be severed transversely into sheet lengths, the heads of which will be retained by the pins, while a

portion of their leading ends in the rear of said pins will overlies the throw-off plate, as 11 or 12. When now the leading end of a sheet carried by this cylinder 21 is approaching the point where the peripheries of the cylinders 21 and 20 run nearest together, the throw-off plate will be vibrated, so as to detach the head of the sheet from the pins and lift it outward off from the cylinder, and thus so guide its leading edge that the latter will be presented in proper position to be seized by the grippers 3 of the cylinder 20, (which pass freely through recesses 71 of the plates 11 13,) be pressed thereby onto the bearers 2, and thus seized become attached to that cylinder, whereupon said sheet will take up the speed of said cylinder and be laid upon the surface thereof and be moved onward thereby.

In the organized machine shown the several cylinders and other rotating parts are suitably journaled in the side frames, and the cylinders 10 20 30 40 are geared together to turn in unison at a speed of surface movement required to be imparted to the main web or sheet lengths thereof by means of wheels 51 52 53 54, being driven in this instance by a pinion 55 on the driving-shaft. The carrying-cylinder 21 is revolved at one-half the surface speed of the receiving-cylinder 20 by means of a wheel 56 on the shaft of cylinder 20, which meshes with a wheel 57 of twice its size on the shaft of cylinder 21, and the cutting-cylinder 23 is driven at the same surface speed as cylinder 21 by means of a wheel 58 on the shaft of the latter, which meshes with a wheel 59 on the shaft of the former.

A conveying-cylinder 25, co-operating with the cylinder 30, is driven in unison with that cylinder by means of a wheel 60, meshing with the wheel 53, and the wheel 60 in turn drives a tape-pulley 26 at a like speed by means of a pinion 61. Delivery-cylinders 41 42 are likewise driven at the surface speed of the principal mechanisms from the wheel 51 through an intermediate 62 and wheels 63 64. All of the gearing thus far described is without the framework, and hence not shown in Fig. 2, which is a view from the gear side of the machine, taken just within the side frames.

The cylinder 30 is provided with bearers, as 4, and coacting grippers, as 5, operating, as do the like devices of cylinder 20, to seize, carry, and release a sheet, the proper vibrations of the grippers being produced by rock-arms or in any well-known manner.

In Figs. 4 and 5 the grippers 3 of the cylinder 20 are shown as provided with a rock-arm 13, a stud or bowl on the end of which runs in the groove of a stationary cam 33, which thus rocks said grippers to close and seize or to open and release a sheet or sheets in a common manner, and the grippers 5 of cylinder 30 are operated by a cam, as 34, and the grippers 16 of the cylinder 25 by a cam, as 75, (see Fig. 2,) in the same manner and to perform like functions. From an examination of Fig. 2 it will be understood that the forms

upon the type or form cylinders 10 40 may be four pages lengthwise and two pages around the same, four forms being thus carried at each end of the cylinder.

5 The type-cylinders 10 40 and impression-cylinders 20 30 of this printing-machine are of a length which is twice that of the carrying-cylinder 21 and the delivery-cylinders 41 42, and it is provided with angular turning-
 10 bars 39 49 for transferring a web printed at one end of said type and impression-cylinders, or at one side of the machine, to the other side of the machine for delivery by the cylinders 41 42, which are at the same side of
 15 machine as the carrying-cylinder 21. By such an arrangement the type-cylinders may carry at one end such forms as are required to print a main web or sheet lengths thereof, and at the other end with such forms as are
 20 desired for the printing of the small or supplemental sheets received from the carrying-cylinder 21. With the cylinders 10 and 40 provided with such forms or printing-plates it will be understood that a web W, led from
 25 a roll M, guided, directed, or carried by suitable means to the cylinder 20, as by pulleys, so as to enter between the cylinders 10 40, as shown in Fig. 3, will, in passing between the type-cylinder 10 and the impression-cylinder
 30 20, be printed upon one surface by the forms upon the cylinder 10, and then, led between the cylinders 20 30 and 30 40, will, in passing between the latter, be printed upon the other side by the forms carried by the cylinder 40,
 35 which web, being of a width equal to half the length of said printing-cylinders, will be led over guide-rollers 37 38, and from the latter pass up over the turning-bar 39 and over and under the turning-bar 49, whereby it will be
 40 shifted laterally or over the other half of the length of the printing-cylinders as it passes outward toward the delivery-cylinders 41 42, which it reaches by being carried over guide-rolls 43, 44, and 45. These delivery-cylinders
 45 41 42 are provided with means for cutting such web into sheets, and the cylinder 41 with means for collecting many sheets upon its surface, and with means whereby when the predetermined number of sheets have been
 50 collected the same may be directed from its surface out to a piling or folding mechanism for simultaneous delivery. The cutting mechanisms of these cylinders 41 42 are of ordinary construction and need no description, as any sheet-severing mechanism may
 55 be employed. The means shown for holding successive sheets upon the cylinder 41 consist of pins 18, which impale their leading ends, formed when the cutting devices
 60 operate. The means shown for delivering the collected sheets from this cylinder consist of throw-off arms 19, which, underlying the heads of the sheets where they are impaled by the pins 18, are vibrated at suitable intervals—
 65 in this case at each third revolution—by means of a rock-arm 76, attached to their shaft, which runs in the groove of a cam 46,

(see Fig. 2,) which cam is revolved at the proper time to accomplish this result by means of a wheel 66 on the shaft of cylinder 70 42, which meshes with a properly-proportioned wheel 66 on the shaft of cylinder 41. (See Fig. 1.) As here shown, the pins 18 are simultaneously vibrated in opposite directions by means of a rock-arm and link connecting with the rock-arm 76, as seen in Fig. 75 3, whereby said pins are moving inward when the said throw-off arms are moving outward; but none of the mechanisms connected with these cylinders 41 42 are herein claimed, the 80 same being shown for illustrative purposes only. When the throw-off arms 19 press the collected sheets outward from the cylinder, they direct them between rollers 47 48, over which run carrying-tapes by which said col- 85 lected sheets are delivered in a pack over folding-rollers 90 91 and beneath a vibrating folding-blade 70, whereby the pack is folded.

The circumferential dimensions of the receiving-cylinder 20 being, as here illustrated, 90 two pages in length, and the supplemental sheets produced by the cylinders 21 23 being one page in length, said cylinder 20 is capacitated to carry an extent of material which is twice the length of the supplemental sheet, 95 and this is received from another source in the form of a web which is to be severed into lengths composing the main sheets of an ultimate product. The small or supplemental sheet delivered by the cylinder 21 to the cyl- 100 nder 20 will therefore, although on another part of the surface of the cylinder 20, be associated with a sheet's length of the main web, which is larger than the supplemental sheet, so that the two will thereafter in defi- 105 nite relation be concertedly manipulated.

In the illustration of a practical use of this associating mechanism, it is shown as combined with a perfecting printing-machine, of which the receiving-cylinder 20 acts as one of 110 the impression-cylinders and co-operates with a type or form cylinder 10 in producing an impression upon one surface of a sheet or web, while a similar impression-cylinder 30 and type or form cylinder 40 in like manner 115 operate to produce an impression upon the opposite surface of such sheet or web, the four cylinders 20 10 30 40 being geared together to run in unison. At one end these type-cylinders-10 40 will be provided with the plates or 120 forms necessary to the printing of the main sheet or web, and at the opposite ends with the plates or forms suitable for the printing of the small or supplemental sheets. Each small or supplemental sheet carried by the cylinder 21 125 is quickly drawn from its surface by the grippers 3 of the cylinder 20, which seize its leading end and lay said sheet upon the surface of the cylinder 20, which sheet will thus be carried by said cylinder 20 between it and 130 the cylinder 10, where it will be printed upon one surface, and then between the cylinders 20 30, where these grippers 3 open to release the sheet and deliver it to the grippers 5 of

the cylinder 30, which latter will close to seize it, lay it upon the surface of the cylinder 30, and carry it between that cylinder and the cylinder 40, where it is printed upon its other side, said grippers 5 finally opening to release the sheet for delivering from said printing-cylinder 30 to the grippers 16 of the conveying-cylinder 25, which grippers in turn open to allow said sheet to enter a taped pathway connecting this conveying-cylinder with the delivery-cylinders 41 42. This pathway consists of a set of upper tapes 35, that run from said cylinder, pass over the tape-pulleys 26, thence pass around pulleys 27, and return to said cylinder over pulleys 28, and of an under set of tapes 36, that run from pulleys 29 in contact with the cylinder 25, pass over the pulleys 26, run under the pulleys 27, and return to the pulleys 29 over pulleys 37 32. These short sheets are in succession delivered by the grippers of the cylinder 25 to the carrying-tapes 35 36, and are conveyed by them under the roller 45 into contact with the web W, which they join, so that said sheet and web are laid together upon the cylinder 41. As this cylinder 41 is of a length equal to that of the short sheet, and it makes two revolutions to each delivery of a sheet upon its surface, it follows that it will collect a short sheet and associate it with the web, which will be severed into a length equal to said short sheet and receive thereon another length likewise severed, so that the ultimate result is three sheets of equal length, (although the supplemental sheet of which may be of less width), which are delivered from said cylinder in a single body or pack to the folding devices.

A printing-machine of the construction illustrated, when provided with this supplemental sheet-introducing mechanism, is capacitated to produce a variety of products. Its type-cylinders are of a size which adapts them to carry eight forms or plates arranged in fours lengthwise and in twos circumferentially, as is illustrated in Fig. 2, and hence it will be obvious that with a proper duplication and appropriate arrangement of the forms suitable slitters to divide the web, cutting mechanisms to sever the web into suitable sheets, a suitable delivery mechanism, and the use of a main web W of the full width of the machine, or equal to the length of the printing-cylinders, such a machine may, without the supplement-introducing mechanism, produce at each revolution of its type and impression cylinders eight products of two pages each, or four products of four pages each, or two products of eight pages each at each revolution; and by using a three-quarter web as the main web W, and providing each type-cylinder with six forms or plates, constituting two sets of duplicates arranged in threes longitudinally and in twos circumferentially, it will result, by transferring two-thirds of the web over the remaining third, that at each revolution of the printing-cylinders

two six-page products will be produced. If the forms are appropriate, these two six-page products would, if associated and delivered as a single product, constitute a twelve-page product, while the two eight-page products before referred to would, if associated and delivered in like manner, constitute a sixteen-page product; but in order that a ten or a fourteen page product may result it is necessary to add to the product made from the main web W a small or supplemental sheet consisting of two pages appropriately introduced into the machine and associated with the main sheet or sheets, which small or supplemental sheet will be half the width of the main sheets.

In order to make a product constituting, say, a ten-page newspaper, the type-cylinder will be equipped with appropriate forms, as follows: they will carry at one end the forms for the main sheet of eight pages on one-half their longitudinal extent, the forms being disposed so that they are two in number placed side by side lengthwise of the cylinder and two in number placed end to end around the cylinder, thus occupying one-half of the surface of the cylinder; and at the other end of the type-cylinders each will carry a one-page form occupying an appropriate remaining quarter of the surface of the first cylinder, this form thus extending longitudinally over one-quarter of the length of the cylinder and circumferentially extending half-way around the cylinder. A main web W, equal in width to half the length of the type-cylinders, will be used for the production of the two main sheets of an eight-page paper, and be led directly between the cylinders 10 20, as shown, and the supplemental web S will be of a width equal to one-quarter of the length of the printing-cylinders and of half the width of the said main sheets. The main web W will be printed on one side in passing between the type and impression cylinders 10 20, and upon the other side in passing between the type and impression cylinders 40 30, the printing-plates of which are disposed, as we have seen, at one side of the machine. This main web lies smoothly over that portion of the cylinders 20 30 which is not provided with grippers 3 4, and after being perfected is led over the rollers 37 38 passes up and is bent over the turning-bar 39 and under the turning-bar 49, and thence is led outward toward the delivery end of the machine, being thus transferred laterally to an extent equal to its width and carried to the opposite side of the machine to that at which it entered, whereby it is made to travel over that half of the machine through which the supplemental web runs, and in advance of the turning-bar 49 it is led over guide-rollers 43 44, and running under a guide-roller 45 is entered upon the pins 18 of the delivery-cylinder 41. The first sheet length entered upon the cylinder 41 is retained thereon, so as to make a second revolution with it, and as the second sheet length from the web W

is laid upon the first sheet length upon that cylinder it is severed by the cutting devices of the cylinders 41 42, so that the product upon the cylinder 41 will then consist of two sheets of the length of the circumference of the cylinder, each sheet bearing four pages of printed matter and constituting an eight-page product. The supplemental web N will be of half the width of the main web, and being directed to between the cylinders 23 24 will have its ends impaled by the pins, say, 6, and be carried upon the surface of the cylinder 21 until the cutting devices of the cylinders 23 21 act and sever it into a sheet length which is traveling at half the speed of that at which the main web is moving, and when the head of this supplemental sheet which overlies the throw-off plate, as 12, is approaching the point of co-operation between the cylinders 20 21 said throw-off plate will be quickly vibrated to throw the leading end of said sheet outward from the cylinder 21 and into a position to be seized by the closing grippers 3 of the cylinder 20, and when the said grippers have so seized this supplemental sheet the latter, then severed from its web, will take up the surface speed of the cylinder 20 and be led upon its surface and carried thereby into contact with the form near the end of the type-cylinder 10, and thereby be printed upon one surface. As the cylinder 20 revolves, the grippers 3 will appropriately open to deliver this supplemental sheet to the grippers 5 of the cylinder 30, which will transfer said sheet to the surface of the cylinder 30 and carry it outward between that cylinder and the type-cylinder 40 and into contact with the form upon the latter, by which it will be printed upon its opposite side, and when the grippers 5 reach their co-operating point with respect to the cylinder 25, the grippers 16 of the latter cylinders will take said sheet from the surface of the cylinder 30 and deliver it into the tapes 35 36, by which it will be carried under the roller 45 and be led into contact with the main web, which also passes around said roller. The arrival of the supplemental sheet at the guide-roller 45 will preferably be so timed as to make said supplemental sheet underlie and accompany the second sheet length of the main web W as it is passing the roller 45 to enter upon the cylinder 41, and hence it results that three sheets of equal length are superimposed upon the cylinder 41, so that the combined product resulting is a three-sheet paper that is delivered from said cylinder to the rollers 48 49 and directed out over the folding-rollers 90 91 to be folded between the latter by the descending folding-blade 70, thus forming a three-sheet product, the outer members of which are of twice the width of the inner member, and the combined whole constituting a ten-page product.

The foregoing sufficiently illustrates a practical use of this improved supplement-introducing mechanism, but it may be remarked

that products consisting of other numbers of sheets may be produced by the entire machine illustrated by a suitable disposition and duplication of the plates and suitable modification of the final delivery apparatus.

Herein the receiving-cylinder 20 is shown as separated such a distance from the carrying-cylinder 21 that their peripheries run some distance apart. This is a desirable structure, because it provides room for the grippers 3 to travel without contact with the sheet on cylinder 21, over the end of which sheet they must travel a distance while standing open and thus projected into a position ready to close and seize said sheet, and this separation of the cylinders also provides a working space for the throw-off plates which carry the end of the sheet into the range of action of said grippers and insure their positive action in seizing such sheet; but these cylinders might be placed nearer together, the sheet-seizing grippers 3 have substituted for them sheet-receiving pins, and the pins 7 be either stationary or reciprocating, the pins substituted for the grippers 3 then protruding into recesses, as 71, in the throw-off plates. These throw-off plates, although of great advantage, are not essential, since it is practical to omit them, and, by giving the grippers 3 (when grippers are used) a greater sweep, partially made through recesses in the face of cylinder 21, the leading ends of the sheets are first raised from the cylinder 21 and then clamped to the cylinder 20 solely by the action of the grippers. The cylinder 21 is shown as provided with the cutting-slots 8 9, coacting with the cutting-blade 1. While this is practical and advantageous, it is also practicable to have the cutting mechanism independent of the cylinder 21, and arrange it to so operate as to sever the web into sheets and deliver them in succession to the sheet-retaining devices of the cylinder 21.

Although the cutting devices are referred to as actually severing the web, it is practical in most cases to have them operate to nearly but not fully divide the web, a complete separation on the line of division being effected by the subsequent strain upon the nearly-separated parts. Although the cylinder 20 in the organized machine illustrated is made to perform the office of an impression-cylinder, it may be provided with means fitting it to successively receive one or more main or large sheets, as well as the small or supplemental sheets, and with means for delivering such sheets collected upon its surface, as is common in the art of printing a web of paper, cutting the same into sheets and delivering sheets, either flat or to other mechanisms for imparting folds thereto. The cylinders 21 22 may be made circumferentially small enough so that the small or supplemental sheet which they form and present for association with the main sheet shall not be long enough to protrude beyond the cutting-line upon which such main sheet is severed from a web, when

ultimate association of the sheets is had upon the surface of cylinder 41. The object of this reduced size is to prevent narrow strips or clippings being severed from the edge of the supplemental sheet.

What I claim is—

1. The combination with a receiving cylinder running at high speed, adapted to receive and support a main web and provided with means for engaging and retaining short or supplemental sheets thereon, of a carrying cylinder running at an appropriate low speed and provided with means for retaining a sheet thereon, the two said cylinders co-operating, the carrying cylinder to slowly feed a short or supplemental sheet onward to the receiving cylinder and the latter to seize and transfer said sheet to its surface in association with the main web, substantially as described.

2. The combination with a cylinder provided with means engaging, retaining and carrying onward sheets delivered in succession to it, a more rapidly moving receiving cylinder provided with means for engaging said sheets and laying the same upon its surface, and means for delivering a main web to said receiving cylinder, substantially as described.

3. The combination of a cutting mechanism for dividing a web transversely into sheet lengths, with a cylinder provided with means engaging, retaining and carrying successive sheets onward, a more rapidly moving receiving cylinder provided with means for engaging said sheets and laying the same upon its surface, and means for delivering a main web to said receiving cylinder, substantially as described.

4. The combination with a revolving carrying cylinder having means for retaining supplemental sheets thereon and means for lifting the leading end of each sheet from off its surface, of a more rapidly revolving receiving cylinder provided at one end with means for engaging and retaining said sheet and carrying the same upon its surface, and having its other end adapted to receive and carry a main web or sheets length, substantially as described.

5. The combination with a revolving carrying cylinder having means for retaining supplemental sheets thereon and means for lifting the leading end of each sheet from off its surface, and a cutting mechanism operating to sever a web into sheets, of a more rapidly revolving receiving cylinder provided at one end with means for engaging and retaining said sheet and carrying the same upon its surface, and having its other end adapted to receive and carry a main web or sheets length, substantially as described.

6. The combination with a revolving carrying cylinder having means for engaging, retaining and carrying onward small or supplemental sheets delivered in succession to it, and a more rapidly moving receiving cylinder provided with means for engaging re-

taining and carrying said sheets, and with means for delivering thereto a main web with which the supplemental sheet is to be associated, substantially as described.

7. The combination with a revolving carrying cylinder having means for engaging, retaining and carrying onward small or supplemental sheets delivered in succession to it, and a more rapidly moving receiving cylinder provided with means for engaging retaining and carrying said sheets, with means for delivering thereto a main web with which the supplemental sheet is to be associated, and provided with means for delivering said sheet from its surface, substantially as described.

8. The combination with a cutting mechanism for dividing a web transversely into sheet lengths and a revolving carrying cylinder having pins for engaging, retaining and carrying each sheet, of a more rapidly revolving receiving cylinder provided at one end with grippers operating to seize said sheet and carry it onward upon its surface, and at the other end adapted to receive and carry a main web, substantially as described.

9. The combination with a cutting mechanism for dividing a web transversely into sheet lengths and a revolving carrying cylinder having pins for engaging, retaining and carrying each sheet, and with a throw off for detaching the head of said sheet from the pins, of a more rapidly revolving receiving cylinder provided at one end with grippers operating to seize said sheet and carry it onward upon its surface, and at the other end adapted to receive and carry a main web, substantially as described.

10. The combination with a cylinder provided with a cutting blade, and a cylinder provided with a cutting slot for co-operation with said blade in dividing a web into sheets and pins for engaging, retaining and carrying said sheets onward, of a more rapidly revolving cylinder provided at one end with grippers operating to seize said sheet and carry it onward upon its surface, and at the other end adapted to receive and carry a main web, substantially as described.

11. The combination with a cylinder provided with a cutting blade, and a cylinder provided with a cutting slot for co-operation with said blade in dividing a web into sheets and pins for engaging, retaining and carrying said sheets onward and with a throw off for detaching the head of said sheet from the pins, of a more rapidly revolving cylinder provided at one end with grippers operating to seize said sheet and carry it onward upon its surface, and at the other end adapted to receive and carry a main web, substantially as described.

12. The combination with a cutting mechanism for dividing a web into sheets, and a revolving cylinder having two sets of pins for engaging, retaining and carrying the sheets, of a more rapidly revolving receiving cylinder provided at one end with grippers oper-

ating to seize each sheet and carry it onward upon its surface, and at the other end adapted to receive and carry a main web, substantially as described.

5 13. The combination with a cutting mechanism for dividing a web into sheets, and a revolving cylinder having two sets of pins for engaging, retaining and carrying the sheets, and throw off for detaching the heads of the
10 sheets from the pins, of a more rapidly revolving receiving cylinder provided at one end with grippers operating to seize said sheet and carry it onward upon its surface, and at the other end adapted to receive and carry a main
15 web, substantially as described.

14. The combination with cutting mechanism operating to sever a web into sheets, a re-

volving carrying cylinder having means for engaging, retaining and carrying onward small or supplemental sheets delivered in succession to it, and a more rapidly moving receiving cylinder provided with means for engaging, retaining and carrying said sheets and with means for delivering thereto a main web with which the supplemental sheet is to be
20 associated, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

LUTHER F. CROWELL,
ROBERT W. HOWARD.