(No Model.) 3 Sheets—Sheet 1.

G. R. KING & A. RAYMOND.

DUPLEX PULVERIZING MILL.

No. 579,587. Patented Mar. 30, 1897.

FIG. I.

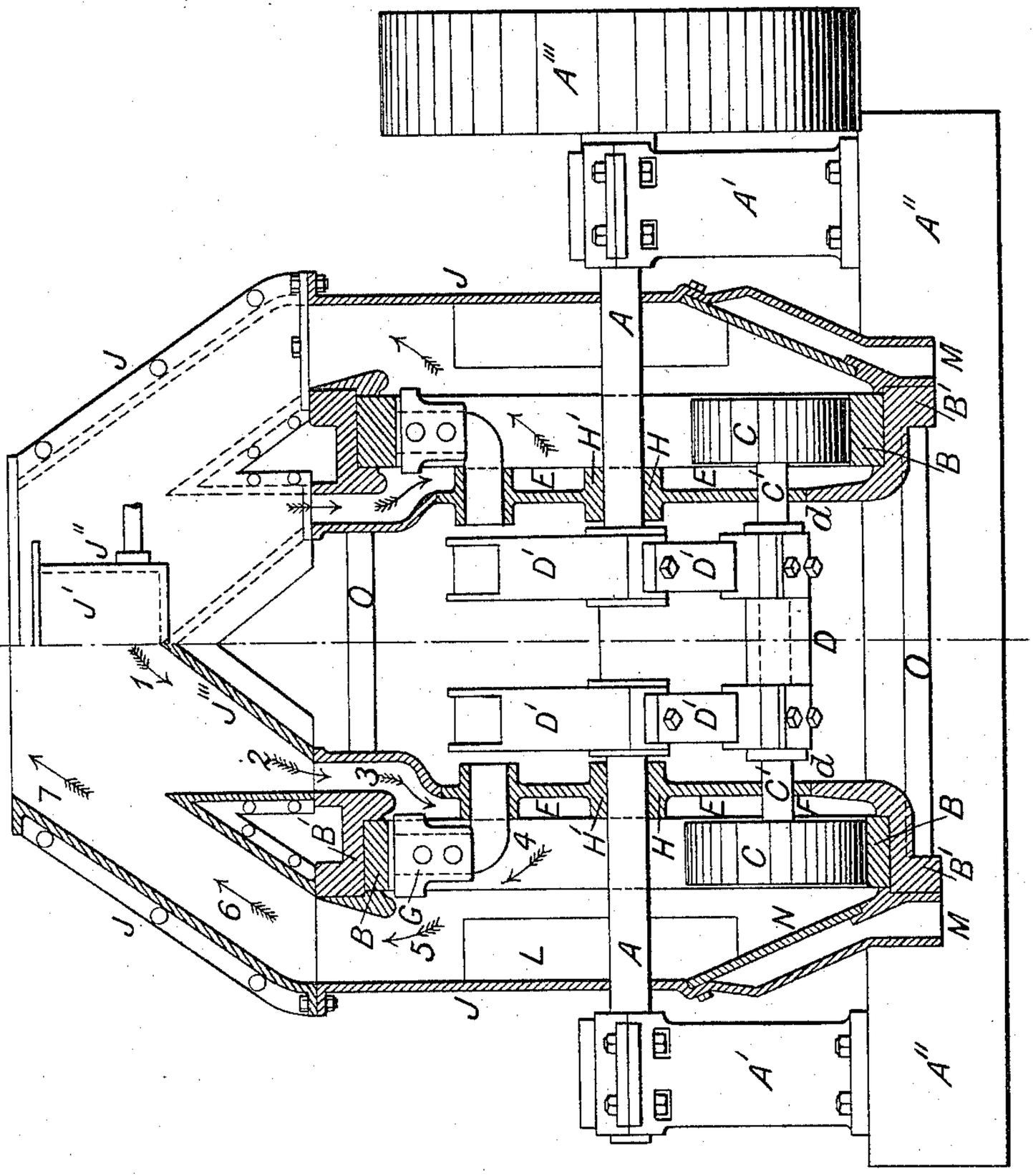

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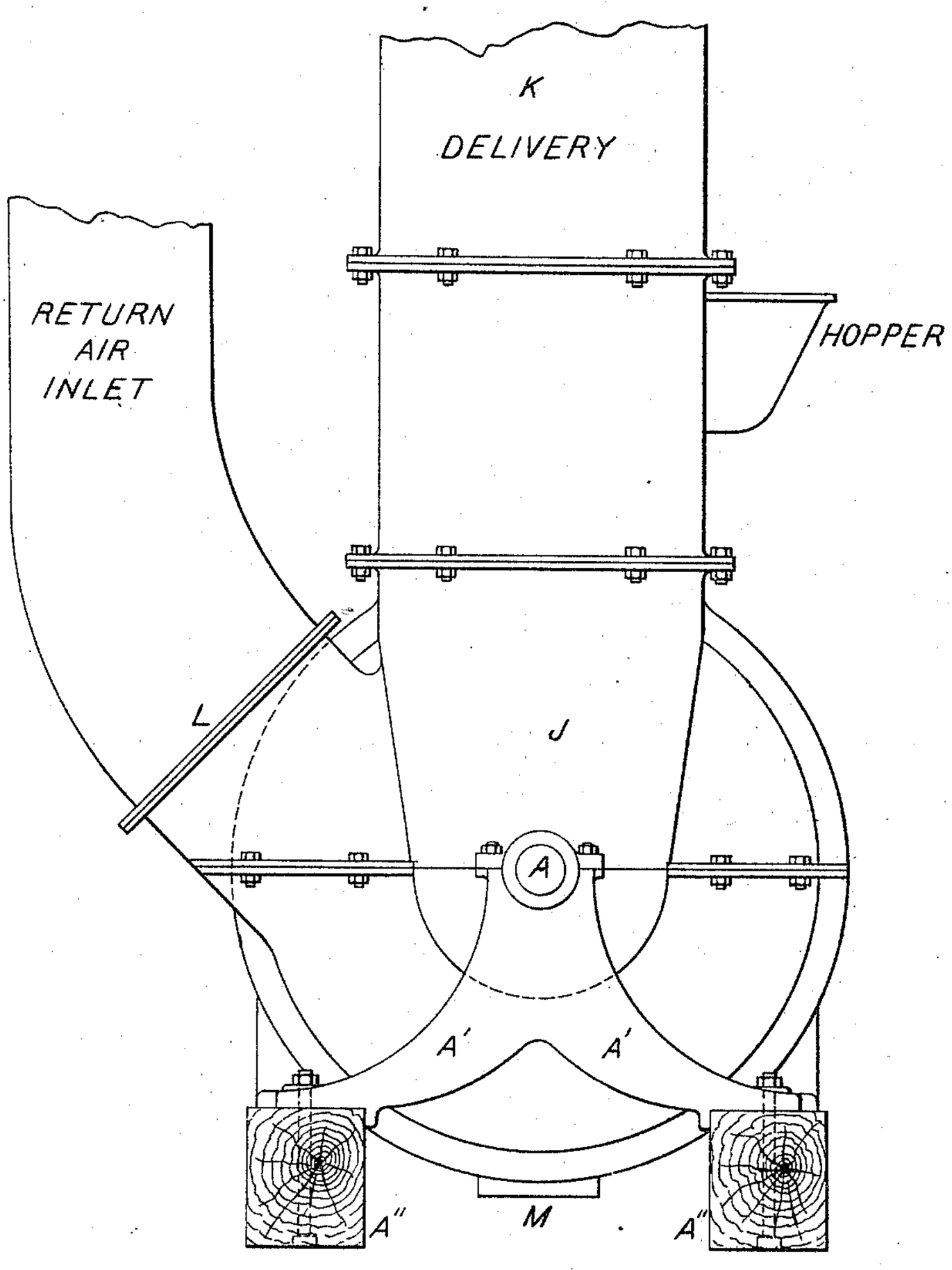
FIG. 2



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(No Model.) 3 Sheets—Sheet 3.

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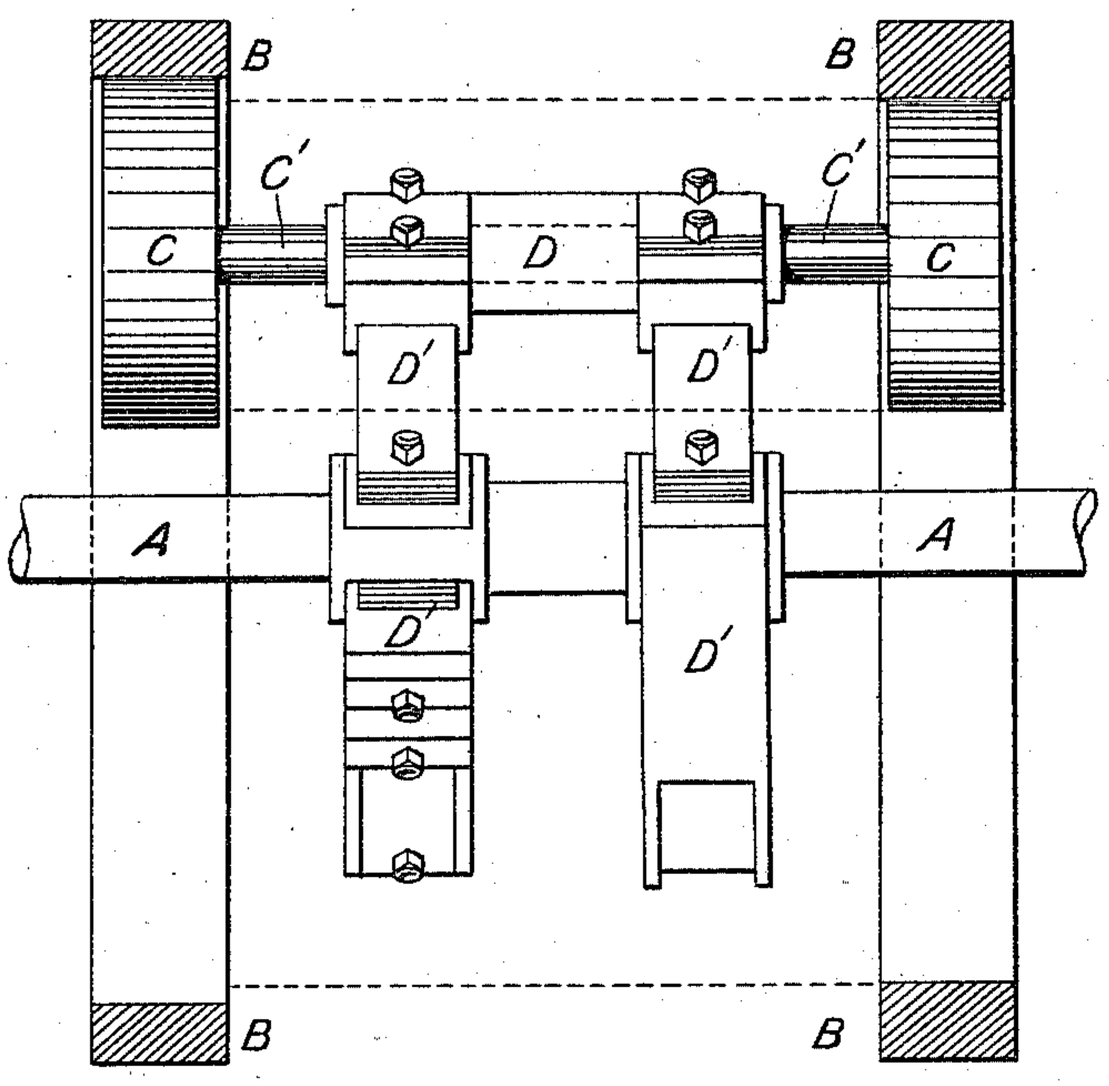
FIG. 3.



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UNITED STATES PATENT OFFICE.

GEORGE R. KING, OF NEW YORK, N. Y., AND ALBERT RAYMOND, OF CHICAGO, ILLINOIS.

DUPLEX PULVERIZING-MILL.

SPECIFICATION forming part of Letters Patent No. 579,587, dated March 30, 1897.

Application filed March 6, 1896. Serial No. 582,066. (No model.)

To all whom it may concern:

Be it known that we, GEORGE R. KING, residing in the city, county, and State of New York, and ALBERT RAYMOND, residing in the city of Chicago, in the county of Cook and State of Illinois, citizens of the United States, have invented a new and useful Duplex Pulverizing-Mill, of which the following is a specification.

Our invention relates to improvements in that class of pulverizing machines or mills which have for their object the reduction to a fine powder of various substances, as lime, gypsum, quartz, ores, coal, &c.

The object of our invention is to increase the efficiency of centrifugal-roller pulverizing-mills in which two rollers are used on the same shaft by making one of the rollers somewhat smaller in diameter than the other and the diameter of the circular die in which the smaller roller travels correspondingly smaller in diameter, whereby one of the two rollers (both being keyed to the same shaft) will more or less slide or slip on the inner face of its die, thereby giving it a friction or rubbing as well as a crushing action, which we accomplish by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section; Fig. 2, an end elevation showing a return air-pipe and a delivery-flue; Fig. 3, a partial view of Fig. 1 to more clearly illustrate the special feature of our improvement.

Similar letters refer to similar parts throughout the several views.

A A is a horizontal motor-shaft suitably mounted on the supports A′ A′, which in turn are secured to the base string-pieces A″ A″, and A‴ is a drive-pulley secured to one end of the said shaft.

B B are cylinder-shaped rings or dies about four feet in diameter and about six inches deep or having a face of about six inches across and secured in the surrounding cases or shells B′ B′, which in turn are secured to the foundation string-pieces A″ A″. The interior of one of these dies (the one on the right in Figs. 1 and 2) is somewhat less in diameter than the other.

C C C are solid cylinder-shaped rollers about eighteen inches in diameter and about six inches thick, that is, having faces about six inches across, which roll on the inner surfaces of the said dies. One of these rollers on each of the roller-shafts (the right-hand one, as shown in Figs. 1 and 3) is somewhat less in diameter than the other for the object above explained.

C′ C′ C′ are the roller-carrying shafts, of which there may be employed one, two, or three, preferably two or three, on each of which is keyed the two rollers, of somewhat unequal diameters, as above explained. These roller-shafts are parallel with the motor-shaft. Between the rollers the roller-shafts are held by elongated bearing-boxes extending from *d* to *d*, one of which, D, is shown in Fig. 1, these in turn being held by two springs D′ D′, the unyielding ends of which are bolted to and revolve with the central driving-shaft. By means of these spring-supports of the elongated roller-shaft bearing-boxes D the roller-shafts are allowed to take a radial vibratory motion sufficient to accommodate the radial action of the rollers in passing over unequally reduced and resistant material to be pulverized.

The plates or heads E E E are provided with U-shaped openings F F F sufficiently large to admit the free passage of the roller-shafts and allow them the necessary radial motion caused by the rollers passing over unequal lumps of material to be pulverized.

G G G are scrapers which serve to remove the material from the inner face of the dies and distribute and mix it while being pulverized.

J J J J is a sheet-iron chamber for feeding the material to be pulverized and discharging it when sufficiently reduced, that is, when it is carried on dry or without the employment of water.

J′ is the hopper for receiving the material, which is uniformly fed to the mill by means of a rotary feeder J″ J″.

J‴ is a partition which separates and directs a part of the material to be pulverized to each side of the mill; that is, to the two dies and two sets of rollers. As the material is fed to the mill it follows the course of the downward-pointing arrows 1 2 3 and enters between the dies and rollers, and when suffi-

ciently pulverized it is drawn or sucked out of the mill in the direction of the upward-pointing arrows 4 5 6 7.

At the top of Fig. 2 is shown the attachment of the mill to an air-separator employed for drawing off finer particles or portions of the pulverized material, and on the left of the same figure is shown the return air-pipe from the separator, usually employed with air-separators to collect and prevent dust, while the coarser particles of the pulverized material which requires further reduction fall back with the fresh feed and are again returned or fed into the mill to be further reduced.

When water is employed in the mill for wet pulverizing, the material may be fed in at either the hopper above described or at the return-inlet L and delivered as it is pulverized at the discharge-openings M M at the bottom of the mill.

When wet pulverizing is carried on, screens N N (see Fig. 1) are employed to allow the finer particles to escape to the discharges M M and retain and keep in the mill the coarser particles, which may need further reduction.

What we claim as new and useful, and desire to secure by Letters Patent, is—

1. In a centrifugal-roller pulverizing-mill the combination of two rollers on a single shaft having different diameters and two circular dies having different diameters, as and for the purpose described.

2. In a centrifugal-roller pulverizing-mill the combination of the single horizontal motor-shaft A A, the two dies B B having different diameters, the roller-shafts C′ C′ C′, the two sets of rollers C C C each of one set of the said rollers having less diameter than those of the other set, the tilting bearing-boxes D D and springs D′ D′ substantially in the manner and for the purpose set forth.

GEO. R. KING.
ALBERT RAYMOND.

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