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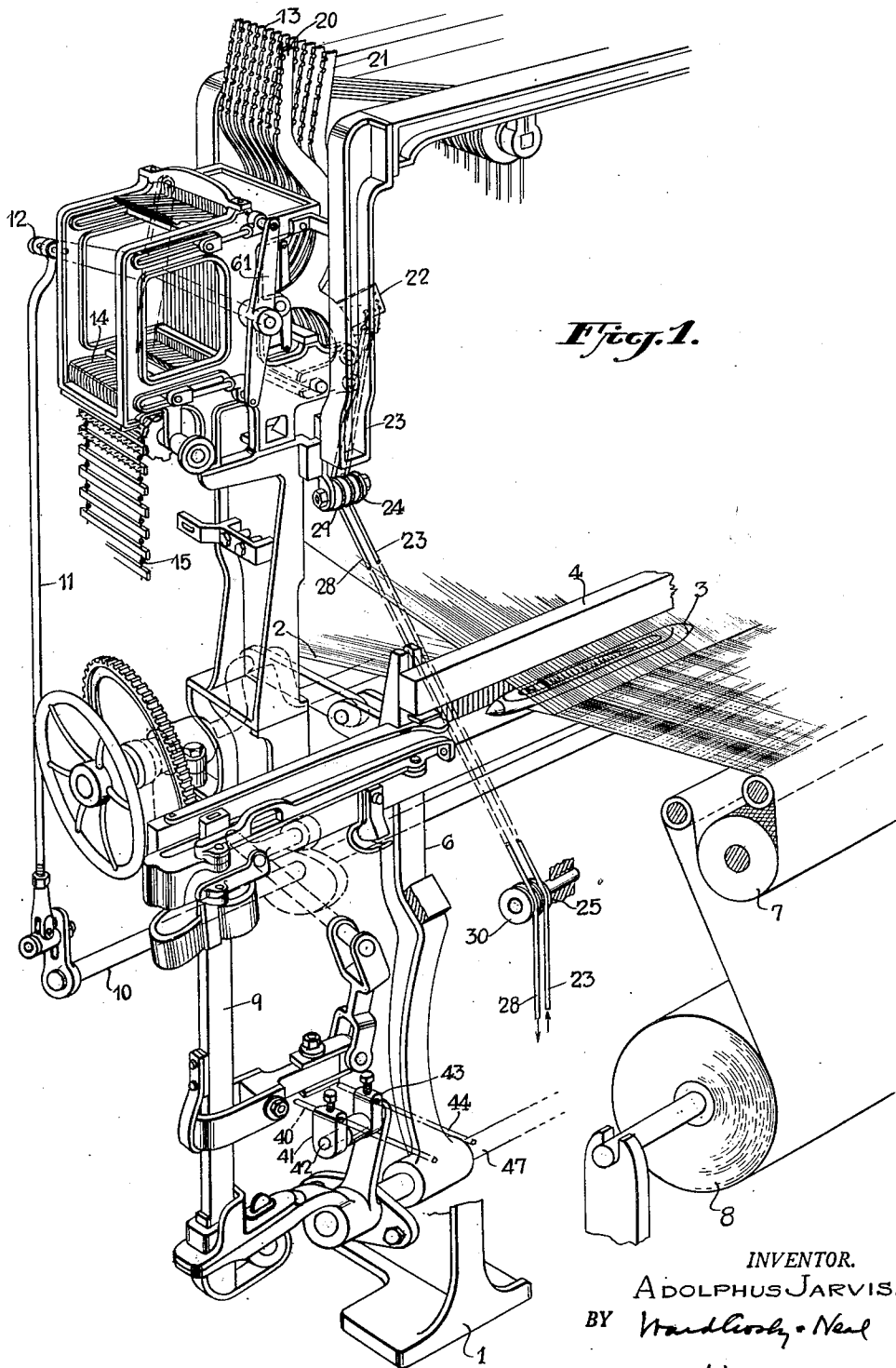
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LOOM

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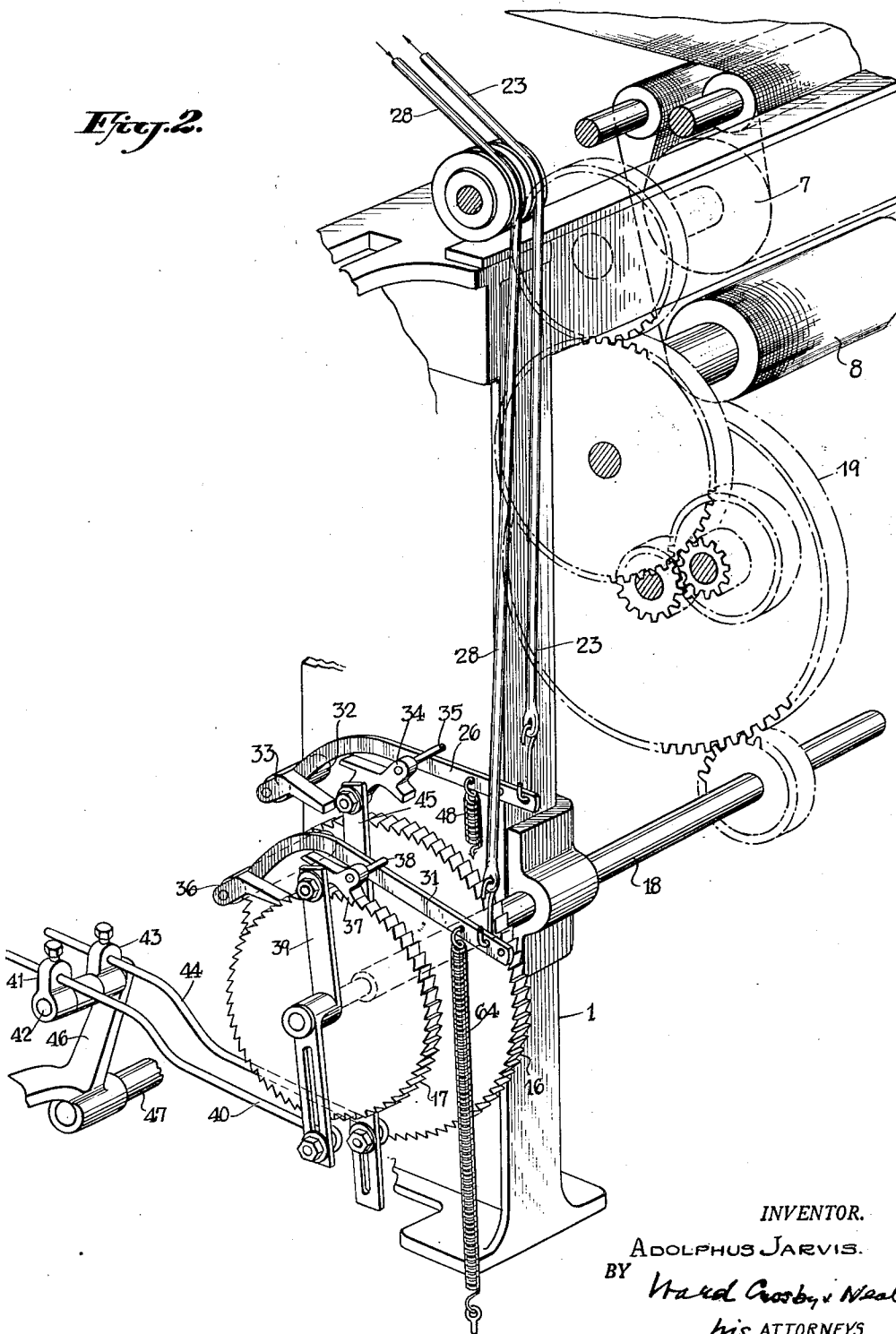
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Fig. 2.



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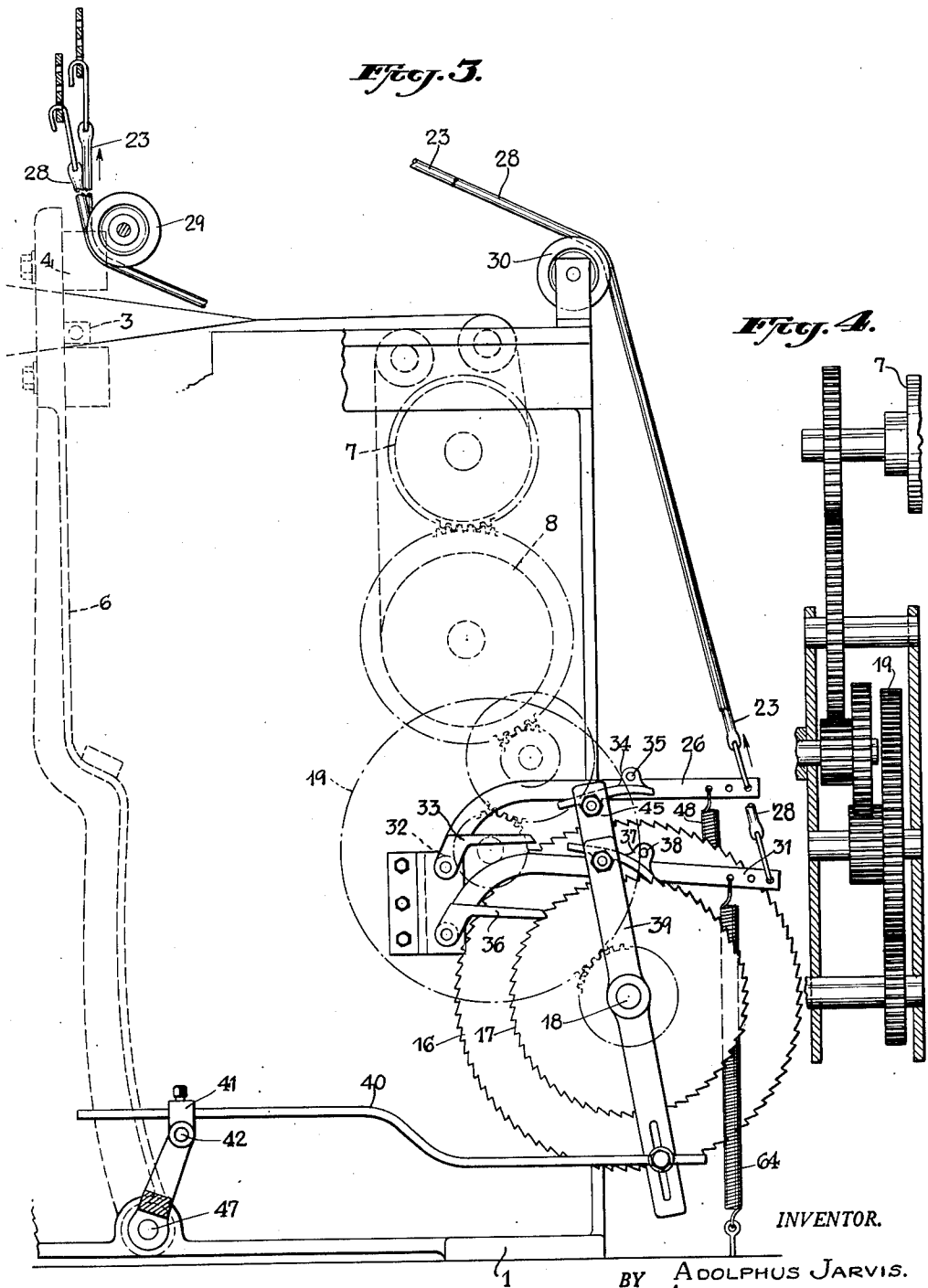
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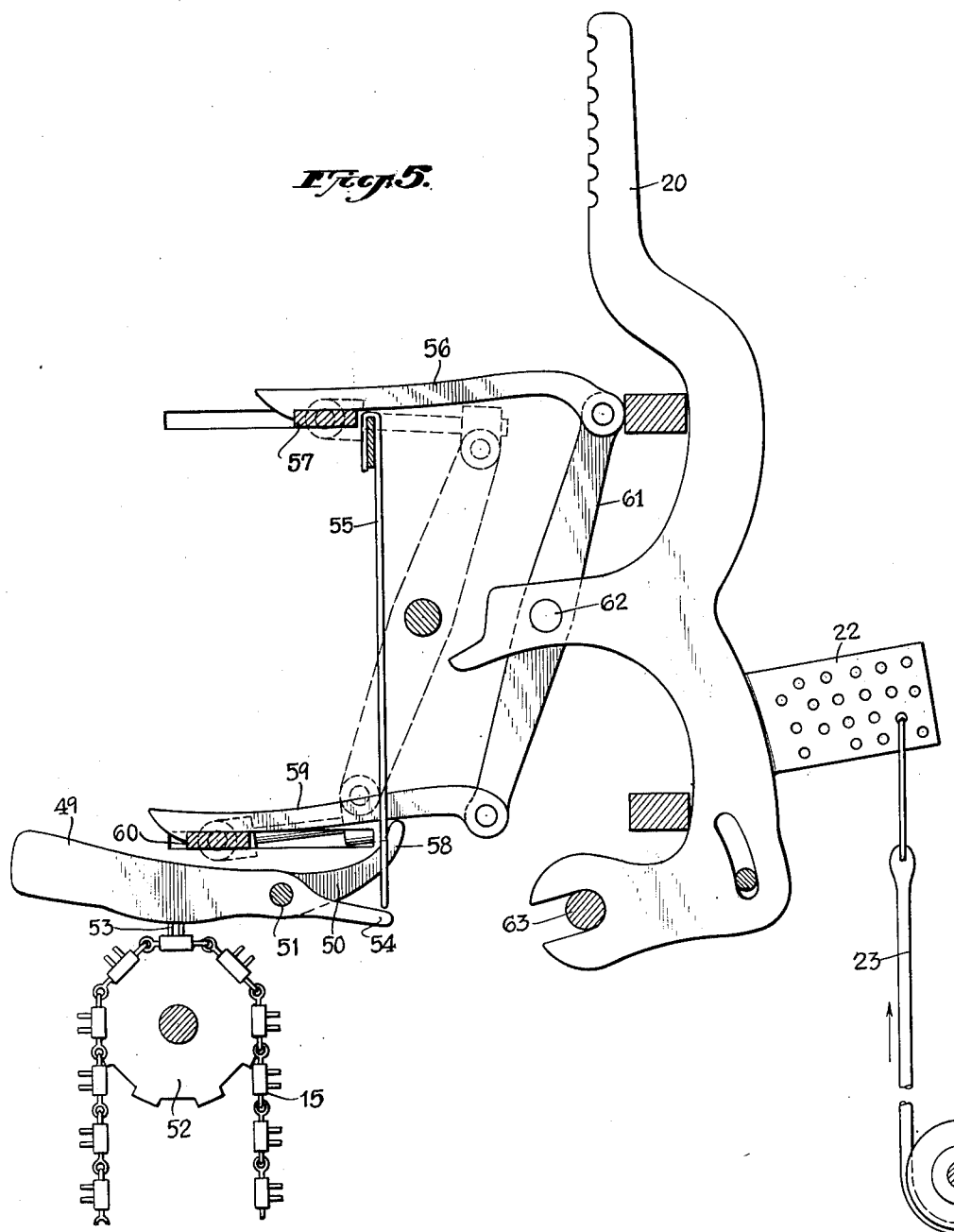
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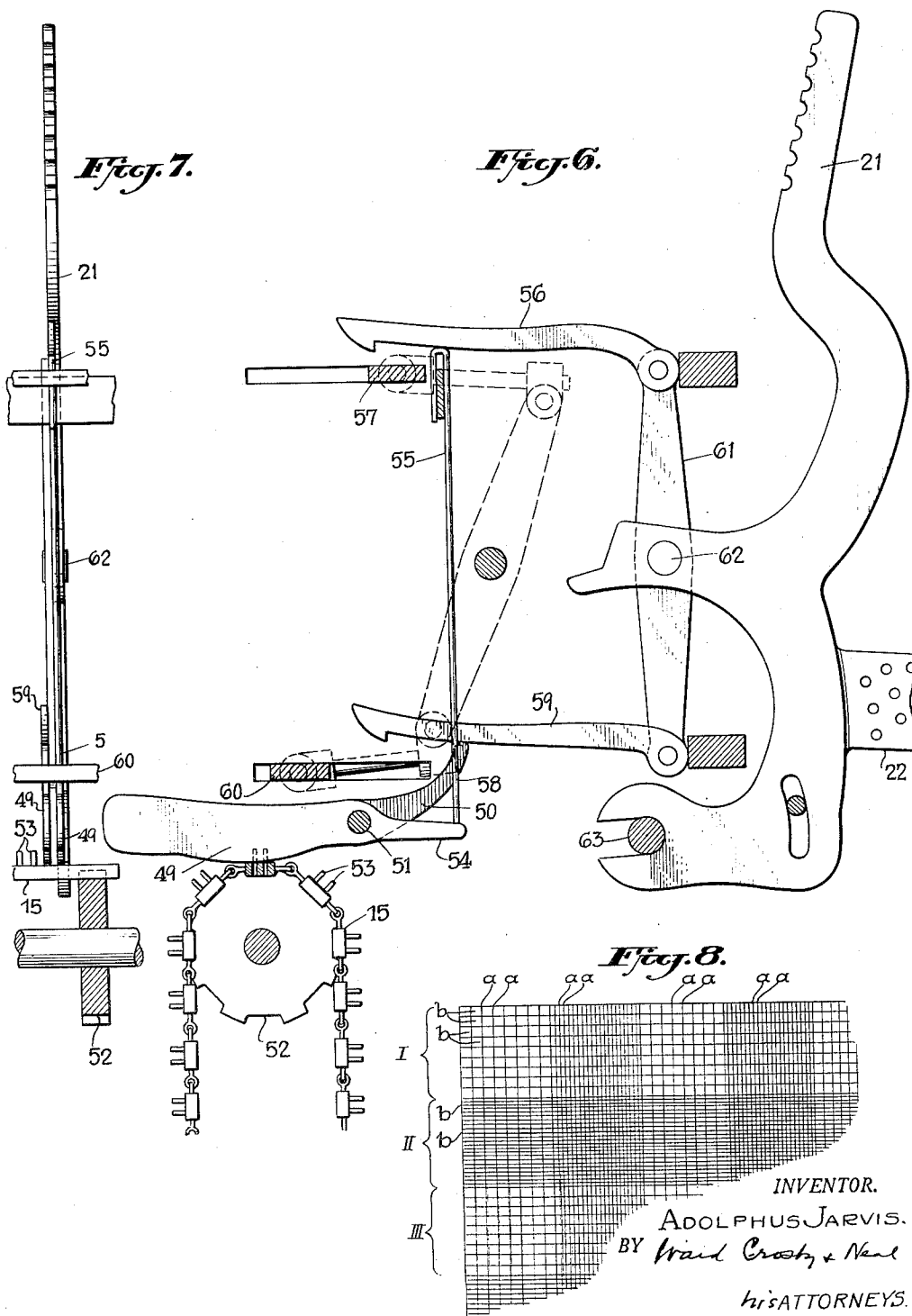
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LOOM

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UNITED STATES PATENT OFFICE

2,613,693

LOOM

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This invention relates to looms and particularly to looms for weaving fabrics having a less density of both warp and filling in certain sections to give a cloth having "shadow effects" or other effects as desired.

It has heretofore been known to weave "barred" dimity and other barred stripes or checked effects. These effects have been provided usually by stopping the loom at certain predetermined intervals and forming stripes by bunching a mass of filling picks, causing them to compact and make a rib effect in the cloth. The barred effects have been made by a similar procedure, crossing the ribs with bunches of warp threads provided in a well-known manner. In other cases, the take-up roll has been speeded up to make a thin portion of the fabric consisting only of warp threads and, upon completion of this portion, the normal weaving operation proceeds. But these operations differ from those of my invention and do not produce the same sort of cloth as described herein.

The principal object of my invention is to provide a simple device of the kind described and which may be built in as part of a loom or may be supplied as a loom attachment for existing looms.

Other objects and features of the invention will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the novel apparatus and combinations thereof, specific embodiments of which are described herein by way of example only and in accordance with the manner in which I now prefer to practice the invention.

The invention will be better understood by reference to the drawings forming part of this application, in which:

Figure 1 represents a perspective view of one side of the upper portion of a loom at and above the sand roll including apparatus of my invention;

Fig. 2 is a corresponding perspective view of the lower part of the loom below the sand roll and including apparatus of my invention, showing connections between the power drive and sand roll;

Fig. 3 is a side elevation corresponding to the showing in Fig. 2;

Fig. 4 is an end view of the gear train shown in Fig. 3;

Fig. 5 is an enlarged detail view showing a dobby jack in forward position and associated mechanism for controlling the actuation of the small ratchet gear;

Fig. 6 is an enlarged detail view of a dobby jack in the rear position with associated mechanism for controlling the actuation of the large ratchet gear;

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Fig. 7 is an end elevation of the dobby jack and associated mechanism, and

Fig. 8 is a diagrammatic fragment of one kind of cloth which may be made by my apparatus.

Referring now to the drawings, the loom shown is one for weaving fabrics having a less density of both warp and filling in certain sections to give various effects including "shadow effects." It includes a frame 1 and a supply of warp thread 2 delivered from a beam (not shown) together with a shuttle 3 and harness including the lay cap 4 and reed 5 and beater for beating up the filling. It also includes a sand roll 7 for drawing cloth from the shed and delivering it to a cloth roll 8. It also includes the usual picker stick 9 and associated parts which are driven from the main drive shaft 10.

The drive shaft has an eccentrically mounted connecting rod 11 thereon communicating with a rocker 12 for operating the dobby, comprising the usual dobby jacks 13 and operating indexers 14 and dobby chain 15. The numbered parts mentioned in this paragraph and the preceding paragraph are all well-known parts of a dobby loom.

In accordance with my invention, I provide, in combination with such a loom, a mechanism controlled by the dobby chain to operate the sand roll at an accelerated speed along with the usual means to operate the shuttle and other parts of the loom substantially without change of the speed and timing thereof. This mechanism operates to produce various check and other effects including fabric portions which are of varying densities, as shown for example but without limitation, in Fig. 8. The mechanism includes (see Fig. 2) a large ratchet gear wheel 16 and a small ratchet gear wheel 17 mounted at one end of shaft 18 which drives sand roll 7 through a conventional gear train 19. The ratchet gears are arranged to be operated alternately and periodically. The small gear 17 is arranged to speed up the rotation of the shaft 18 and thereby the rotation of the sand roll to draw the cloth and its components more rapidly through the loom. When the larger ratchet gear is in operation, the sand roll is driven at a predetermined normal speed. The speed and timing of the shuttle and other parts of the loom are maintained at substantially the same rate whether the sand roll is operated at normal or accelerated speed. The device for initiating the change in the speed of the sand roll operates so that such change occurs after the shuttle 3 has completed one pass through the shed and the warp is passing at the changed speed at the time that the shuttle makes the next succeeding pass through the shed. The effect is accordingly that while the warp is speeding up, the filling threads will be spaced further apart and, when the warp

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is traveling at a normal speed, the filling threads will be spaced closer together.

In order to effect the control of the operations mentioned in the last paragraph, I provide two dobby jacks 20 and 21 (see Fig. 1) which form part of the usual dobby jack series but which are provided with attachments for forming part of the control device mentioned. Jack 20 has a jack extension 22 to which is attached a strap 23 passing over pulleys 24 and 25 to a lever 26 (see Fig. 2). This lever is shown in raised position so that the ratchet gear 16 is not in action, as described more fully below. Jack 21 is similarly provided with an extension 27 to which is attached a strap 28 passing over pulleys 29 and 30 to lever 31 which is shown in lowered position, thereby causing the actuation of the smaller ratchet gear wheel 17 which is driving the shaft 18 and consequently the sand roll 7 at accelerated speed.

Lever 26 is pivoted at 32 to the frame and to it is attached a holding dog 33 which, when lowered, engages the teeth on the ratchet gear 16 to hold it against counter-clockwise rotation. The normal rotation of gear 16 is clockwise as herein shown. The raised position of the lever 26 has also raised the driving ratchet dog 34 by contact with a pin 35 attached to this dog which is elevated when the lever 26 is raised. When the lever 26 is lowered, the driving dog 34 contacts the teeth of the ratchet gear wheel 16 to drive it in the manner described below.

On the other hand, jack 21 is in retracted position and accordingly its strap 28 has lowered the lever 31 into position to drive gear wheel 17 clockwise. This lever 31 has pivoted at one end a stop dog 36 which functions to prevent counter-clockwise movement of gear 17. The driving dog 37 for the small ratchet gear is shown coacting with the teeth of this gear. It has been lowered into position by its pin 38 which rests on the top of the lever 31 and, accordingly, descends with this lever. In the position shown in Fig. 2, the small ratchet gear 16 is driving the shaft 18 and, accordingly, the sand roll 7 at accelerated speed.

The rocker arm 39 is mounted on the extremity of the shaft 18 and has its lower end pivotally attached to a bar 40 mounted in a swivel block 41 swinging on a stud 42. Along side swivel block 41 is another swivel block 43 mounted on the stud 42 which in turn is connected through bar 44 with rocker arm 45 for a purpose described below. The two swivel blocks 41 and 43 are oscillated by a swinging arm 46 which is operated from the rocker shaft 47 operated from the main drive shaft 10. The rocker arm 45 has pivotally mounted thereon the driving dog 34 which drives the large ratchet wheel 16 when lowered into operative position.

Referring now to Figs. 5, 6 and 7, the movement of jacks 20 and 21 is controlled as shown therein. In Fig. 5, the jack 20 is shown in its forward position, causing the strap 23 and attached lever 26 to raise, thus throwing the normal speed ratchet gear out of action. This raising is effected against the pulling of a spring 48 which has one end attached to the lever 26 and the other end attached to the floor. The movement of jack 20 is controlled by a pair of indexers 49 and 50 mounted to swing about a pivot 51. These indexers and associated parts are of a conventional type well known in the art. The control of the indexers is by means of the dobby chain 15 operating over the dobby cylinder 52. This dobby chain has a series of

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wooden strips spaced in the usual manner from one another and on these strips are mounted pins spaced at suitable positions to operate at the proper time the indexers to move them upwards or to lower them in a well-understood manner. In Fig 5, a pair of such pins designated as 53 has raised one end of each of the indexers 49 and 50, thus lowering the opposite ends. At the end 54 of the front indexer in Fig. 5 is attached a rod 55 which has been lowered to allow the upper latch 56 to contact with the usual griff bar 57. At the same time, the lowered end 58 of the rear indexer has lowered to allow the lower latch 59 to seize the griff bar 60 and the seizure of these griff bars by the latches has moved the jack 20 forward to throw the large ratchet wheel 16 out of operation. Latches 56 and 59 are pivotally mounted at either end of a rocker arm 61 which is pivotally mounted at 62 in the central offset portion of the jack 20. In swinging forward, the jack 20 has swung about the pivot 63 located at its lower extremity. The griff bars 57 and 60 are operated in a well-known manner through the connecting rod 11 and rocker 12 which is in turn connected to operate the rocker arm 61.

The jack 21 shown in Fig. 6 is of identical construction. This jack is shown in retracted position, having been retracted by its strap 28 attached to lever 31 which is held in lowered position by the spring 64 having one end attached to the lever 31 and the other end attached to the floor. Jack 21 has been moved into its retracted position by the downward movement of the left end of its indexers 49 and 50. This lowering has been effected because there are no studs on the dobby chain contacting therewith and accordingly the lower edges of the indexers rest on the slats of the chain. This has resulted in the elevation of the right end 54 of indexer 49 with the raising of its rod 55 to push the upper latch out of engagement with the griff bar 57. Meanwhile, the finger 58 of indexer 50 has moved the lower latch 59 out of engagement with griff bar 60, whereupon the jack is released and brought into its retracted position as stated by the strap 28 and spring 64.

The operation of the device is believed clear from the foregoing description. For weaving a specific cloth such as shown in Fig. 8, but without limitation, the following takes place: The loom is set up in the usual manner for the weaving of a plain fabric at normal speed and, accordingly, the dobby chain is set so that the jack 20 is in retracted position and the jack 21 is in advanced position. Thus, the strap 23, lever 26, driving dog 34 and holding dog 35 are in lowered position ready to drive the ratchet gear 16 at normal speed. Thereby the take-up roll is driven at normal speed. As an example, we shall assume that we shall weave a checked fabric, as shown in Fig. 8. Under these circumstances, the warp threads *a* are arranged to be fed from the warp beam in a well-known manner so that there are alternate equal sections of warp of less and greater density, as shown. This arrangement of warp is in accordance with well-understood practice. Upon starting the loom, the filling threads *b* may be woven into the fabric at the higher speed to give a relatively light fabric as shown at the upper portion of Fig. 8. This will continue through that portion of the fabric designated as I. When that much of the fabric has been woven until the end of section I has been reached, such fabric will be of the

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density shown, having approximately 50 filling threads per inch. The portion of the fabric designated as II is shown as having a higher density and will show that the number of filling threads has increased to 100 threads per inch. It is important at this point to note that the transition from section I to section II must be made so that upon weaving the last filling thread of section I, it will lie parallel to its preceding filling threads and that the next filling thread which is necessarily spaced at a greater distance from the last filling thread of section I than the filling threads of said section I are spaced from one another, will also lie parallel to this last thread in section I. For this purpose, it is necessary that the initiation in the change of speed of the sand roll is such that the change occurs after the shuttle has completed the pass through the shed with the filling thread constituting the last thread of section I and that the warp is passing at the slower speed at the time that the shuttle makes the next succeeding pass through the shed to produce the first thread of section II. This is effected by timing set up by the dobby chain 15. Such timing is well understood in the art and is arranged by bringing, respectively, an unpegged portion or a pegged portion of the chain under indexers 49, 50 for each of the jacks 20 and 21 at the proper time for shifting from high-speed operation of the sand roll 7 through ratchet gear 17 and the normal speed operation of said sand roll through ratchet gear 16. It is to be noted that in accordance with the invention one or the other of these gears is always in operative connection with its respective driving dog, namely, dog 37 for gear 17 and dog 34 for gear 16.

The sequence of operation for weaving the portion of the cloth of lighter density after the last thread of section II has been laid is as follows: Immediately after the shuttle has laid the last thread of section II, the space on the dobby chain 15 comes in contact with the indexers for jack 21. Jack 21 is thereby released from its forward position and is snapped into its rearward position by the spring 64 operating through lever 31, whereby driving dog 37 and dog 36 come into contact with the ratchet gear 17. At the same moment that jack 21 is being lowered to actuate the high speed ratchet gear 17, pegs 53 on the dobby chain strike indexers 49 and 50 of jack 20 whereby the latches associated with this jack grasp the griff bars and the jack is pulled forward against the pressure of spring 48 to raise the lever 26 and thereby disconnect the driving dog 34 and dog 33. Accordingly, the accelerated motion of the sand roll 7 occurs substantially immediately after the shuttle 3 has come to rest after laying the last thread in section II. This accelerated motion is sufficient to move the shed ahead to evenly space the first thread of section III to the next thread of section II as indicated, since the shuttle remains in its box until the precise moment when the first shed under the accelerated motion has been made. At that moment the shuttle then proceeds back in the opposite direction from that for laying the last thread of section II and lays the first thread of section III. When the end of section III has been reached, the same instantaneous timing for advance of jack 21 and retraction of jack 20 must be made in order to preserve the proper spacing and parallel relation of the filling threads of section III with respect to the next succeeding section.

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The fabric thus woven in accordance with the above may have threads all of the same color or may have striped threads in the warp which may be provided in the well-understood manner. Instead of having all of the threads of cotton, they made be made of other fibrous material if desired. Such other material may be dyed or otherwise as preferred.

While I have described my improvements in great detail and with respect to preferred forms thereof, I do not desire to be limited to such details and forms since many changes and modifications may be made and the invention embodied in widely different forms without departing from the spirit and scope thereof in its broader aspects. Hence I desire to cover all modification, forms and embodiments coming within the language or scope of any one or more of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a loom, a combination of a sand roll, a shuttle, a dobby chain, first means for driving said sand roll at a normal speed, second means for driving said sand roll at a different speed, means controlled by said dobby chain for disconnecting said sand roll from said second driving means and drivingly connecting said sand roll with said first means, and for alternatively disconnecting said sand roll from said first driving means and drivingly connecting said roll with said second means and means to operate the shuttle and other parts of the loom substantially without change of the speed and timing thereof.

2. In a loom, a combination of a sand roll, a shuttle, a dobby chain, a driving shaft arranged to drive said sand roll, small and large ratchet gear members mounted on said shaft, and a mechanism controlled by said dobby chain for alternately driving said small and said large gear members to speed up and run at normal speed respectively said sand roll while maintaining substantially the same speed in timing of the shuttle and other parts of the loom.

3. In a loom, a combination of a sand roll, a shuttle, a dobby chain, a driving shaft arranged to drive said sand roll, small and large ratchet gear members mounted on said shaft, a mechanism controlled by said dobby chain for alternately driving said small and said large gear members to speed up and run at normal speed respectively said sand roll while maintaining substantially the same speed and timing of the shuttle and other parts of the loom, and means to initiate the change in speed of the sand roll so that said change occurs after the shuttle has completed one pass through the shed and the warp is passing at the changed speed at the time that the shuttle makes the next succeeding pass through the shed.

4. In a loom, a combination of a sand roll, a shuttle, a dobby chain, a driving shaft arranged to drive said sand roll, small and large ratchet gear wheels mounted on said shaft, a mechanism controlled by said dobby chain for alternately driving said small and said large gear wheels to speed up and run at normal speed respectively said sand roll while maintaining substantially the same speed and timing of the shuttle and other parts of the loom, pawls for said ratchet gear wheels, and a mechanism to lower and raise alternately the respective pawls into and out of engagement with the normal speed- and accelerated speed-ratchet gear wheels.

5. In a loom, a combination of a sand roll, a

shuttle, a dobby chain, a driving shaft arranged to drive said sand roll, small and large ratchet gear wheels mounted on said shaft, a mechanism controlled by said dobby chain for alternately driving said small and said large gear wheels to speed up and run at normal speed respectively said sand roll while maintaining substantially the same speed and timing of the shuttle and other parts of the loom, dobby jacks and studs on the dobby chain arranged to contact with devices to operate said jacks to lower and raise alternately the respective pawls into and out of engagement with the normal speed- and accelerated speed-ratchet gear wheels.

6. In a loom, a combination of a sand roll, a shuttle, a dobby chain, a ratchet gear mounted on said drive shaft, a smaller ratchet gear mounted beside it, a pawl for each of said ratchet gears, a lever for each of said pawls, and dobby jacks controlled by a dobby chain and connected to said levers for raising and lowering the levers and thereby the pawls into and out of engagement with said ratchet gears for controlling alternately the speed of the sand roll.

7. In a loom, in combination, a beam for warp thread, a harness, a shuttle, a beater, a dobby chain, a sand roll, a drive shaft, gears meshing with said drive shaft and sand roll, small and large ratchet gear wheels mounted on said shaft, and a mechanism controlled by said dobby chain for alternately driving said small and said large gear wheels to speed up and run at normal speed respectively said sand roll while maintaining substantially the same speed and timing of the shuttle and other parts of the loom.

8. In a loom, in combination, a beam for warp thread, a harness, a shuttle, a beater, a dobby chain, a sand roll, a drive shaft, gears meshing with said drive shaft and sand roll, small and large ratchet gear wheels mounted on said shaft, and a mechanism controlled by said dobby chain for alternately driving said small and said large gear wheels to speed up and run at normal speed respectively said sand roll while maintaining substantially the same speed and timing of the shuttle and other parts of the loom, and means to initiate the change in speed of the sand roll so that said change occurs after the shuttle has completed one pass through the shed and the warp is passing at the changed speed at the time that the shuttle makes the next succeeding pass through the shed.

9. In a loom, in combination, a beam for warp thread, a harness, a shuttle, a beater, a dobby chain, a sand roll, a drive shaft, gears meshing with said drive shaft and sand roll, mechanism controlling the rotational speed of the sand roll and accordingly the speed of cloth thereover, including a large ratchet gear mounted on the drive shaft, a second smaller ratchet gear mounted on said shaft, to speed up the sand roll periodically, each of said ratchet gears having a ratchet mounted on a lever, dobby jacks each having a strap passing from said jack to its respective lever, and upon forward and backward motion of the jack lowering and raising the ratchet into and out of contact with its respective gear, and a mechanism controlled by said dobby chain to periodically and alternatively actuate the two ratchet gears, to operate the sand roll at normal speed when the large ratchet gear is driven and at accelerated speed when the smaller ratchet gear is operated.

10. A mechanism for attachment to a loom comprising, in combination, a large ratchet gear

member, a second smaller ratchet gear member, said members being arranged to be mounted on a drive shaft for driving a sand roll, each of said ratchet gear members having a ratchet mounted on a lever, two dobby jacks each having a connection from the jack to its respective lever and, upon forward and backward motion of each jack, arranged to lower and raise the ratchet into and out of contact with its respective gear, said jacks being arranged to be operated from a dobby chain to periodically and alternatively actuate the ratchet gears to drive the shaft at different speeds.

11. A mechanism for attachment to a loom comprising, in combination, a large ratchet gear member, a second smaller ratchet gear member, said members being arranged to be mounted on a drive shaft for driving a sand roll, each of said ratchet gear members having a ratchet mounted on a lever, two dobby jacks each having a connection from the jack to its respective lever and, upon forward and backward motion of the jack, arranged to lower and raise the ratchet into and out of contact with its respective gear and indexers for operating said jacks respectively, said indexers being arranged to be operated periodically by pegs on a dobby chain to throw in and out of action alternately the small and large gear for driving the sand roll.

12. In a loom, a combination of a sand roll, a shuttle, a dobby chain, first means for intermittently rotating said sand roll a first predetermined amount, second means for intermittently rotating said sand roll a second predetermined amount, means controlled by said dobby chain for drivingly connecting said sand roll with said first means and for alternatively drivingly connecting said sand roll with said second means, and means to operate the shuttle and other parts of the loom substantially without change of the speed and timing thereof.

13. In a loom having a sand roll and a dobby chain, first means for driving said sand roll at a normal speed, second means for driving said sand roll at a different speed and means controlled by said dobby chain for disconnecting said sand roll from said second driving means and for drivingly connecting said sand roll with said first means and for alternatively disconnecting said sand roll from said first driving means and drivingly connecting said roll with said second means.

14. In a loom having a sand roll and a dobby chain, first means for intermittently rotating said sand roll a first predetermined amount, second means for intermittently rotating said sand roll a second predetermined amount, and means controlled by said dobby chain for drivingly connecting said sand roll with said first means and for alternatively drivingly connecting said sand roll with said second means.

ADOLPHUS JARVIS.

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