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LOOM

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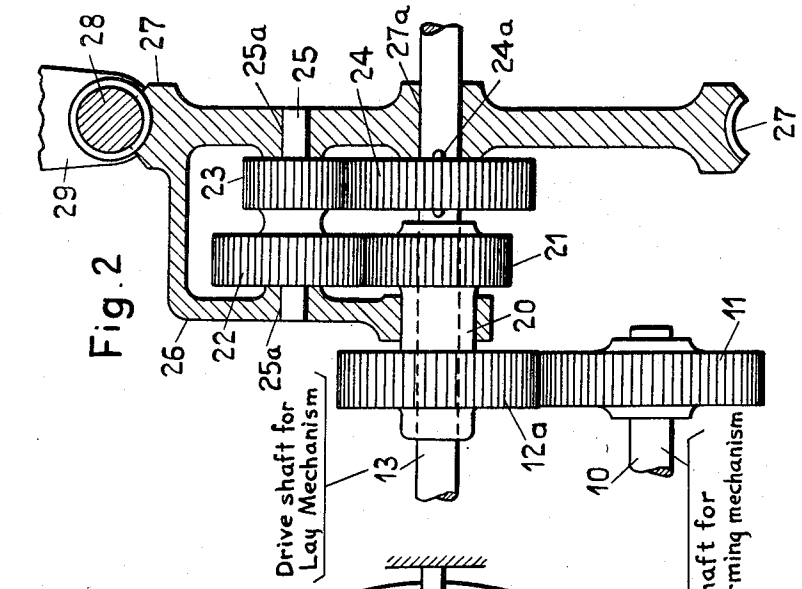


Fig. 2

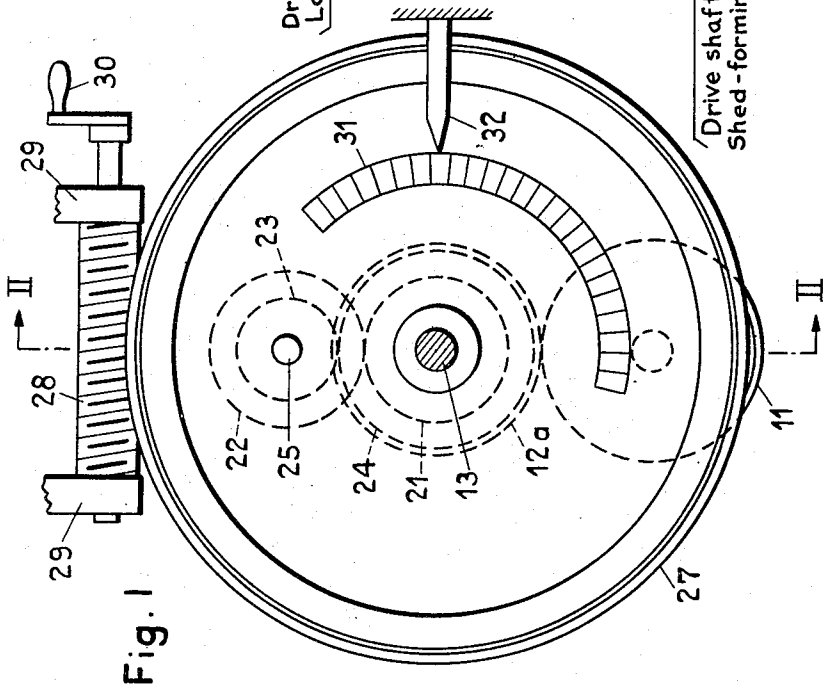


Fig. 1

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LOOM

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In conventional looms, the shedding mechanism such as the cam shaft for driving the harnesses or the dobby, mostly is moved through a gear drive or chain gear by the drive for the other loom mechanisms. Timing the beat-up motions and shedding motions relatively to each other is fixed according to definite rules when setting up the loom and, as a rule, will not or rarely be altered any more. Resetting requires special tools, knowledge and considerable work. Moreover, fine adjustment is not possible at all as a rule.

Timing the shedding motion relatively to the beat-up motion is of greatest importance for the weaving operation, in particular when producing tight or dense fabrics or synthetic fiber fabrics which present increased difficulties. Such knowledge forms the basis of the present invention.

My invention relates to a loom which in the main is distinguished by the insertion of an adjusting gear between the loom drive and the shedding mechanism, whereby timing of the shedding motion relatively to the beat-up motion may be continuously changed. Preferably there are provided at least one scale and an appurtenant reading mark to indicate the chosen setting.

In a conventional loom construction, the mechanism for forming the shed, for example the eccentric shaft for the drive of the loom shafts or the dobby, is set in motion, usually through a gear or chain transmission, by the drive mechanism for the remainder of the loom, in particular by the drive for the lay mechanism. The moment of the closing and opening of the shed in relation to the movement of the lay is established according to certain instructions, when the loom is installed and is, as a rule, never or rarely changed. If, thereafter, a displacement of the phase position of the shed forming mechanism in relation to the lay drive is desired, special tools and knowledge and considerable labor are required. A fine adjustment of the phase is, as a rule, not possible. Moreover, the resetting of the phase can be done only when the loom is at a standstill, i. e. not running.

When producing tightly woven fabrics, or fabrics of man-made fibers which involve increased difficulties, the moment of closing of the shed in relation to the striking of the lay i. e. the phase between the two is of greatest importance, and it is the principal object of the present invention to make it possible to effect an adjustment in that phase without having to bring the loom to a standstill. In accordance with the invention, the apparatus for enabling the phase as between the shed closing and lay strike to be adjusted while the loom is running comprises a first gear wheel mounted for free rotation on the shaft which drives the lay, this first gear wheel being coupled to the shaft which drives the shed-forming mechanism, a transmission shaft spaced laterally from the lay driving shaft, this transmission shaft having mounted thereon two gear wheels, one of which is meshed with the first gear wheel and the other being meshed with a second gear wheel mounted upon and secured fast to the lay driving shaft, this transmission shaft being mounted in a frame which is pivotable about the axis of the lay driving shaft, and an

adjusting gear between the frame and a standard or other fixed member on the loom enabling one to adjust the frame pivotally while the loom is running and thereby effect a corresponding change in the phase as between the lay and shed forming mechanism drive shafts. The adjusting gear may comprise a worm wheel secured on the frame concentric with the lay driving shaft and a worm mounted for rotation on a fixed part of the loom. According to a further feature of the invention, a scale and associated pointer are provided to indicate visually the particular adjusted phase position of the shed forming mechanism relative to the lay drive.

The foregoing as well as other objects and advantages inherent in the invention will become more apparent from the following detailed description of a preferred embodiment and the accompanying drawings. In these drawings:

Fig. 1 is a view in elevation showing a portion of the loom drive together with the phase changing mechanism; and

Fig. 2 is a vertical section taken on line II—II of Fig. 1.

With reference now to the drawings, it is to be noted that in the interest of simplifying this disclosure none of the operating components of the loom itself such as the shed forming mechanism, the lay mechanism or the shuttle mechanism have been illustrated since their structures per set are well known and require no structural modification to incorporate the present invention.

The loom to which the invention is applied includes a shaft **10** which serves as the drive shaft for the shed-forming mechanism and is so indicated by legend on the drawing. For driving this shaft, a gear wheel **11** is mounted upon and secured to it. Gear wheel **11** is meshed with a gear wheel **12***a* secured upon a hollow shaft **20** which in turn is mounted for free rotation upon another drive shaft **13**. The latter serves to drive the lay mechanism, as indicated by legend, and may be the main drive shaft of the loom, it being driven by an electric motor, not shown, and being mounted for rotation in the loom frame and having cranks thereon for driving the lay. The hollow shaft **20** has secured upon it another gear wheel **21** of slightly larger diameter which is displaced laterally of the gear **12***a* within a frame **26**, more about which will be said later. Another gear wheel **24**, which is of larger diameter than gear wheel **21**, is mounted upon shaft **13** within the frame **26** and is secured fast upon shaft **13** by means of a key **24***a*.

The two coaxially arranged gear wheels **21** and **24** are coupled to each other by means including a transmission shaft **25** extending laterally of drive shaft **13** and parallel with the latter, the transmission shaft being mounted for rotation in sleeve bearings **25***a* located in the opposite end walls of the frame **26**. Two gear wheels **22** and **23**, structurally integrated, are mounted upon the shaft **25**. Gear wheel **22** which is of larger diameter than gear wheel **23**, is meshed with gear wheel **21**, and gear wheel **23** is meshed with gear wheel **24**.

In accordance with the invention, the frame **26** is mounted for pivotal adjustment about the axis of shaft **13** and to this end it will be seen from Fig. 2 that the frame **26** is structurally integrated with a worm wheel **27**, the hub portion of which is provided with a bore **27***a* through which the shaft **13** extends, the bore **27***a* being essentially of the same diameter as shaft **13** so that the latter serves as a support for the gear wheel **27** concentric with shaft **13**. A worm **28** meshing with worm wheel **27** is mounted for rotation in spaced standards **29** or another convenient fixed portion of the loom, and a crank **30** at the end of the worm **28** is provided for rotating the same. The worm gearing **27—28** is so designed as to be self-locking and hence serves as an adjusting gear enabling the gear **21** to be displaced relative to the drive shaft **13**.

The meshing gears **21** and **22**, **23** and **24**, and **11** and **12***a* have a number of teeth such that the transmission ratio between the drive shaft **13** and drive shaft **10** is 1:1. However, such ratio can be changed if desired.

In order to enable one to obtain a visual indication of the phase adjustment as between shafts **13** and **10** and hence the phase of the lay relative to the shed forming mechanism, the worm wheel **27** is provided at one side with an arcuate scale **31** arranged concentrically therewith, and a stationary pointer element **32** is mounted on a fixed part of the loom frame. Preferably the scale **31** is calibrated in the so-called shed-closing angle. The shed-closing angle is taken to be zero when the shed is closed at exactly the same instant that the lay strikes; the angle is positive when the shed closes earlier, and indicates the angular path, in degrees, which the shaft **13** must still travel before the lay strikes. The shed-closing angle is negative when the shed is closed after the lay strikes. In most cases occurring in practice, the shed-closing angle is adjusted between plus 60 and minus 45 degrees. However, the scale **31** may also be calibrated in units of path, or time, so that one can read how many units of path or time earlier, or later, the shed is closed than the lay strikes.

During rotation of worm **28**, the frame **26** is pivoted about the axis of drive shaft **13**, resulting in displacement of the hollow shaft **20** and hence of the gear wheel **12***a* of the drive (gear wheel **11** and drive shaft **10**) for the shed-forming mechanism relative to the drive shaft **13** for the lay mechanism. On the other hand, by means of the gear wheels **21** to **24**, rotation of the drive shaft **13** is transmitted to the hollow shaft **20**. By means of worm gearing **27**, **28**, the movement phase of the shed-forming mechanism can be displaced continuously relative to the movement phase of the lay drive in such manner that the moment of shed closing relative to striking of the lay is varied. Because the worm **28** is arranged on the stationary part of the loom frame, the displacement of the phase position can be carried out while the loom is running. The particular phase setting can be read on scale **31** also while the loom is in operation. It is also possible, of course, to reverse the locations of the scale **31** and pointer **32**, placing the scale **31** on a stationary part of the loom and placing the pointer element **32** on the frame **26**. The described phase adjusting mechanism in accordance with the invention can also be used in connection with a dobby, a Jacquard machine, or a Verdol machine.

I claim:

1. In a loom having a first drive shaft for driving the lay mechanism of the loom and a second drive shaft driven by said first shaft for driving the shed-forming mechanism of the loom, means for effecting a change in the relative phase positions as between said first and second drive shafts and hence a corresponding change in phase as between the lay and shed-forming mechanisms of the loom, said phase changing means comprising, a first gear wheel mounted for free rotation on said first drive shaft, means coupling said first gear wheel to said second shaft for driving the same, a transmission shaft spaced laterally from said first drive shaft and having two gear wheels mounted thereon one of which meshes with said first gear wheel and the other of which meshes with a second gear wheel mounted on and secured fast to said first drive shaft, said transmission shaft being mounted for rotation in a frame which is pivotable about the axis of said first drive shaft, and an adjusting gear between said frame and a standard of the loom enabling said frame to be adjusted pivotally thereby to effect a change in the phase positions as between said first and second drive shafts.

2. A loom structure as defined in claim 1 wherein said adjusting gear for effecting a pivotal adjustment of said frame about the axis of said first drive shaft comprises a worm wheel fastened to said frame concentric with said first drive shaft and a worm meshed with said worm wheel and mounted on said standard for rotation.

3. A loom structure as defined in claim 1 and which further includes a scale element and an associated pointer element, one of said elements being stationary and the other being mounted on said frame for indicating a particular adjusted phase position as between said first and second drive shafts.

4. A loom structure as defined in claim 1 wherein said means coupling said first gear wheel to said second drive shaft includes a further gear wheel mounted on said first drive shaft for free rotation with respect thereto, said further gear wheel being laterally displaced from said first gear wheel outside said frame and rotated by said first gear and being meshed with a gear wheel mounted on and secured fast to said second drive shaft.

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