The Scientific Film Institute at Göttingen

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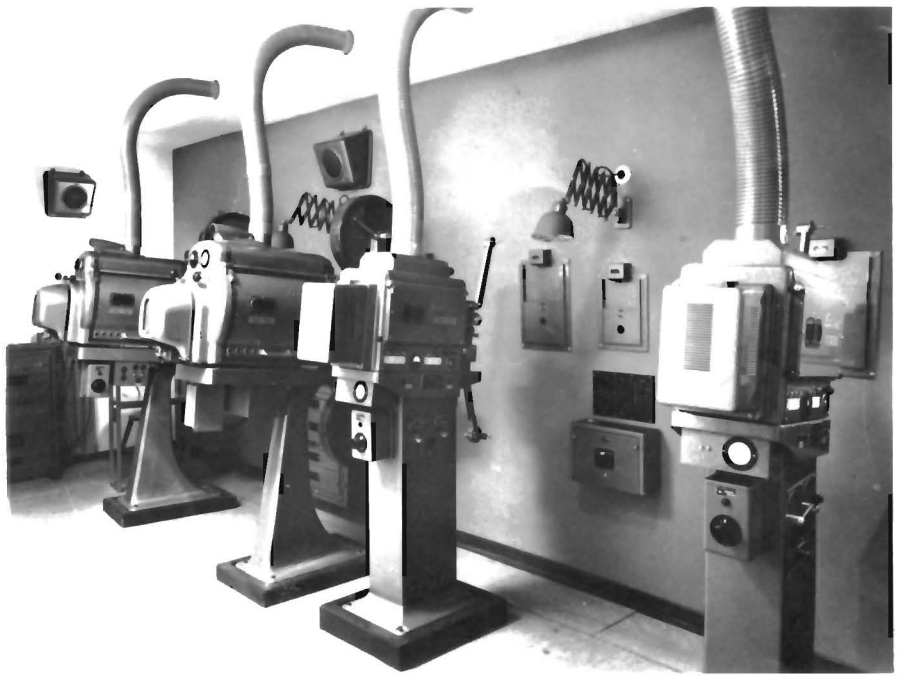
THIS WONDERFUL Institute is the realisation of a twenty-five-year-old ambition and largely the culmination of the intense efforts of its permanent Director, Dr.-Ing. Gotthard Wolf, FRPS, over that period. It is fairly safe to say that there is nothing quite like this establishment anywhere in the world, for under its group of roofs is to be found practically every facility needed by research workers using cinematography in a multitude of scientific disciplines and industrial and other processes, in all its applications as a basic means of investigation and recording.

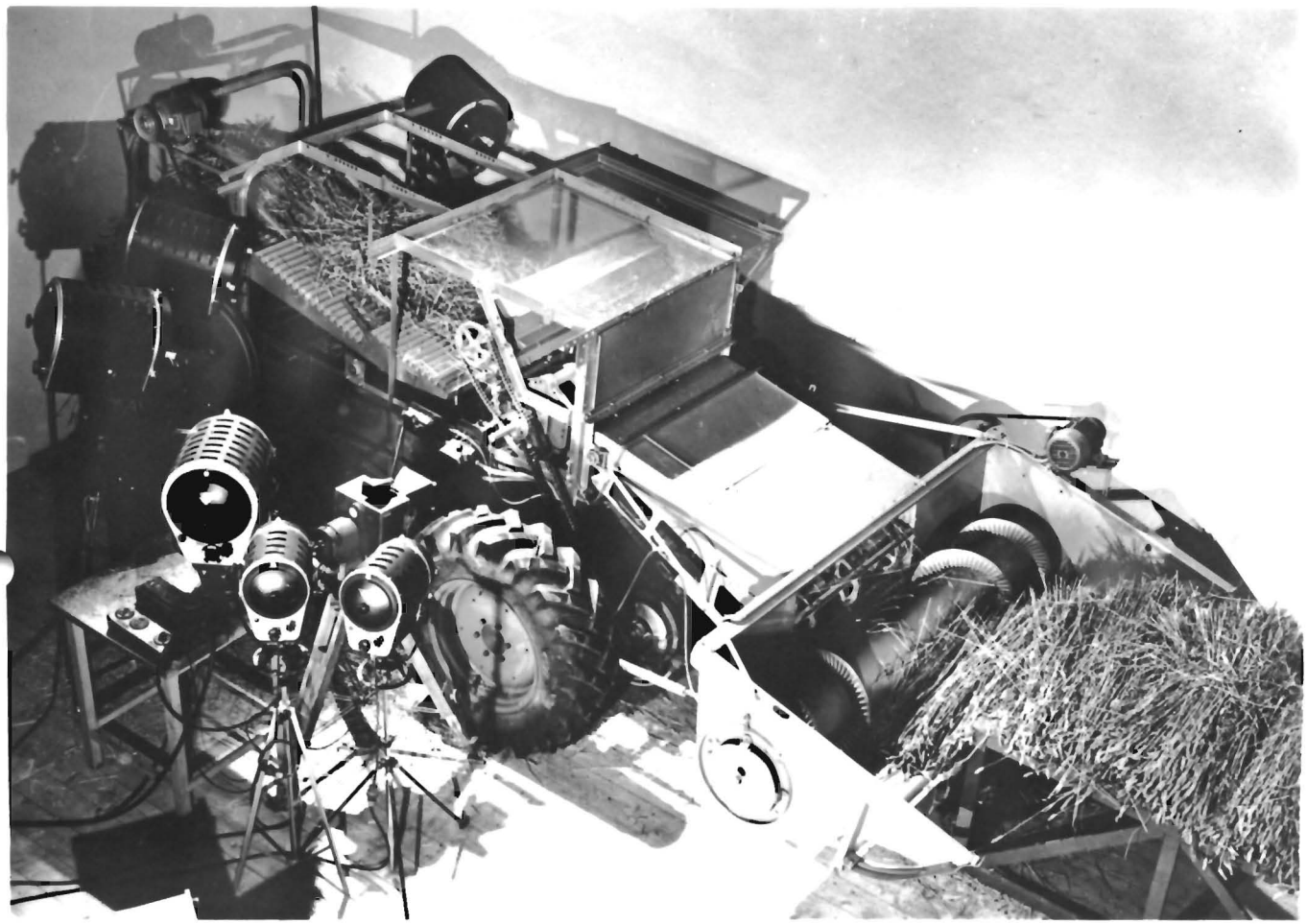
Until this year the Institute had been housed in some of the buildings of the Max Planck Society nearer to the centre of the town, but the need for additional space and specialised buildings had become so essential that completely new planning for a set of buildings of its own was undertaken. The new site, of almost six acres, lies to the north-east of the town of Göttingen on the slope of a hill along the right-hand side of the ancient Nuns' Way, an old road leading to a convent just over the hill. Although rather bare when we were there for the mid-year meeting of the Research Film Section of the International Scientific Film Association, the site will obviously be a very beautiful one when the landscape gardening is completed.

The principal building closest to the road contains the administrative offices as well as the main auditorium, the library and narrow-gauge film vaults in the basement. The auditorium seats 120 people in comfort, is fully air-conditioned (as are several of the other important sections of the Institute) and has excellent projection facilities. These include a pair of Bauer B.II 35 mm sound-on-film machines with 1000 watt xenon lamps, a pair of Bauer Selection II.0 16 mm sound-on-film machines with 1000 watt xenon lamps, slide projectors for all sizes of lantern-slides and transparencies, tape-recording equipment for the recording of conferences and lectures, as well as the many accessory devices generally associated with a projection room. Since a number of international meetings are held at Göttingen during the year the hall is fitted with a radio system for simultaneous translation in three languages. Three permanent sound-proof booths are installed at the back of the hall from which the three-language versions are radiated. Visitors are loaned small battery-operated transistor Siemens receiver units, with light-weight headphones, on a neck-strap. Each is provided with four switched channels, one of which receives directly from the microphone at the lecturer's rostrum and the other three the different language versions —at the recent meeting to which reference has been made the three versions were English, French and German.

An interesting point about the installation is that, in addition to the monitor

Projector equipment for the main auditorium.





High-speed cinematography being used to investigate the operation of a threshing machine.

loudspeaker in the projection-room, there is another speaker connected to the speaker's microphone so that the projectionists can follow a lecture and be ready without any hesitation to show slides or films at the precise point required. From the visitors' point of view, too another sensible arrangement was the careful timing of the programme and the breaks in it for coffee and biscuits mid-morning and mid-afternoon—members of the Institute staff outside the hall were also wearing receiver-units and could follow the progress of each session without having continually to look into the hall so that everything was ready at the end of a given contribution. It is obvious that considerable thought has been given to the purely ' mechanical ' side of the installation to ensure that there is the minimum disturbance to the participants of a conference or meeting.

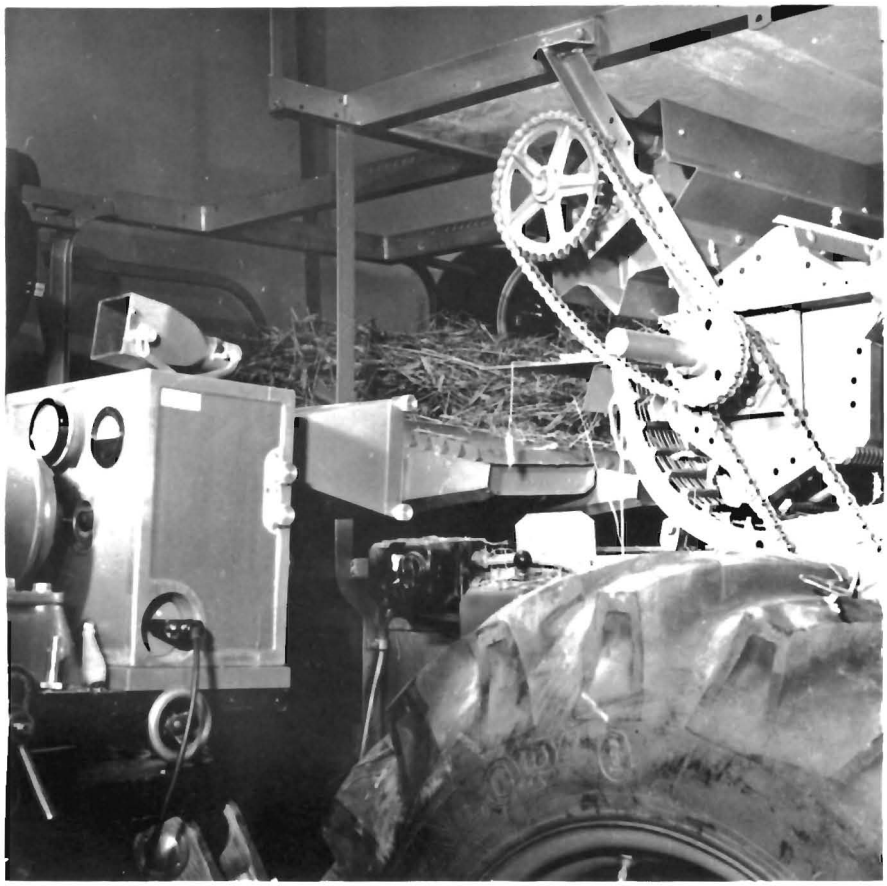
In addition to the main hall there is a second smaller one used as a formal lecture-theatre. In this case seating for 37 people only, at tiered benches, is provided—the projection facilities again include 35 mm and 16 mm Bauer sound-on-film equipment, as well as those for transparencies and slides of all formats.

On the practical side the studios and laboratories are most impressive, not only as regards number and size, but also for the completeness of their installations. At the time of our visit working demonstrations of typical investigations were set up as they would have been for the actual research projects involved.

The largest main studio has an area of about 1500 square feet and an overall height of about 25 feet. In addition to a steel-framed gallery running round the four sides of the studio at high level for the placing of overhead lighting, there are two 3-ton DEMAG cranes on tracks for handling large pieces of machinery and equipment. One end of the studio has large double doors opening out on to a covered way leading to one of the internal roads on the site, so that the biggest lorry can be driven straight into the studio or large items of plant off-loaded by means of one of the cranes, all under cover.

In this, as in all other studios and laboratories, there are inset wall-mounted switchboard panels (in the main studio also at gallery level) for the outlet sockets for light and power with switches and fuses grouped together, the aim being not only great flexibility in the power supply but also to avoid trailing cables to lighting and other units crossing the working area of the floor.

There is another subsidiary studio, also used for engineering investigations, rather more than half the size of the main one but without crane facilities. In this case the lighting units are suspended from rails or tracks along the ceiling by means of lazy-tongs or lattice-works. The lighting units, by Weinert of Berlin, can be completely controlled from ground level. The three essential movements of turn (or horizontal rotation), tilt (in the vertical direction) and focus have worm-gear drives terminating in D-shaped rings on flexible stems. The tongue of a flat metal hook on the end of a light bamboo pole can be slipped into any one of these rings to make whatever adjustment is required, even though the lamp is



twelve or fifteen feet above floor level, quite easily and very precisely.

The sound studio is about the same size as the second largest studio and is again very fully equipped for recording and play-back, professional type Siemens' Klangfilm magnetic tape-recorders being installed. The projection equipment is again Bauer, similar in type to that installed elsewhere in the Institute, but in this case fitted with Rotosyn synchronising equipment for working in conjunction with the tape-recording equipment, for the post-synchronisation of commentaries and dubbed tracks.

To any mechanically-minded cinematographer who has waited impatiently for some simple piece of accessory equipment to be made, the engineering workshop is a delight. It is as fully equipped as many medium-sized factory tool-rooms, well organised and staffed. In this workshop special plant and equipment is designed and made so that the solving of difficult problems is made easier. The maintenance on the vast amount of apparatus and accessories is also facilitated and carried out quickly so that lost studio time is reduced to the absolute minimum.

Slightly uphill from the main block and the large studio group of buildings are the two laboratory buildings, the first having a single floor and the second two floors, both being connected by covered passage-ways. At the end of the first building there is also a very large greenhouse for botanical work. The smaller of the two laboratory buildings contains a number of separate rooms, each fully equipped with cinemicrographic apparatus, for biological, medical, chemical and physical experimental research work. Cinemicrography and its many special techniques have always played a most important part in the work of the Institute and a considerable amount of development work has been done as far as the actual apparatus is also concerned.

The larger of the two laboratory blocks is primarily devoted to high-speed photography and cinematography, in which the principal studio has an area of about 1200 square feet. Work up to 10,000 pictures per second can be handled, involving very high voltages and the latest techniques in image dissection. Ancillary rooms house accumulator-banks, darkrooms and a workshop—for, in this section again, much original work is done requiring skilled electronic and mechanical engineering. The 'stills' section is also housed here and fulfils the needs of the whole Institute, including

◀ Close-up of threshing machine in action.

Recording of the shattering of laminated glass under impact. ▶

Below: Filming a spider at work.

record photography, black-and-white and colour work, document-copying and so on. Its equipment is as complete as, and matches in general excellence, that in the rest of the Institute.

In the uppermost corner of the site is the Director's house and just below it a small block containing the house of the chief electrical engineer (whose responsibilities in an installation of this kind are very heavy and complex) as well as guest rooms for visiting scientists and research workers. At the opposite end of the site is the house-keeper's residence. An interesting solution to the problem of safe storage of 35 mm negative, duplicate negative and positive film copies has been reached by building the film-vaults into the side of the hill, just above the high-frequency laboratory.

Lastly, there is the main transformer house: its contents give a very clear indication of the electrical load which the work of the Institute requires. In it there are three quite large transformers, one of 400 kVA, one of 250 kVA, and another of 100 kVA, giving a total of 750 kVA, which would be quite enough to supply a respectable sized village with power. Of this load, for instance, about 120 kW is required for the air-condition-

ing plant, which holds certain parts of the Institute at a temperature of about 63°F. and a relative humidity of 65 per cent.

Supporting Dr.-Ing Wolf in the work of the Institute are ten scientists, covering the fields of pure science, medicine, biology, ethnology, botany and so on, as well as Dr.-Ing J. Rieck, who deals with the mechanical engineering side of the activities. These scientists can, in turn, call upon the services of six cameramen, each with an assistant, the team being led by Herr K. Nowigk. Six other assistants are in training. Each cameraman has, in his charge, an Askania Z outfit, complete in every respect for 35 mm work. Some of these equipments also have time-lapse accessories. There is also a complement of ten 16 mm outfits, three of which are Arriflexes, as well as an Arricord sound-film camera for location work. Apart from highly specialised high-speed equipments there are also five 35 mm and six 16 mm equipments with facilities up to 8000 pictures per second, of generally available types, such as Fastax, etc.

The extent and range of lighting equipment is also great; in addition to mirror lamps, arc lamps, expendable flash outfits, and electronic flash of every conceivable kind there are no less than fifty 2 kW, fifteen 5 kW, and fifteen 500 watt incandescent focusing spotlamps.

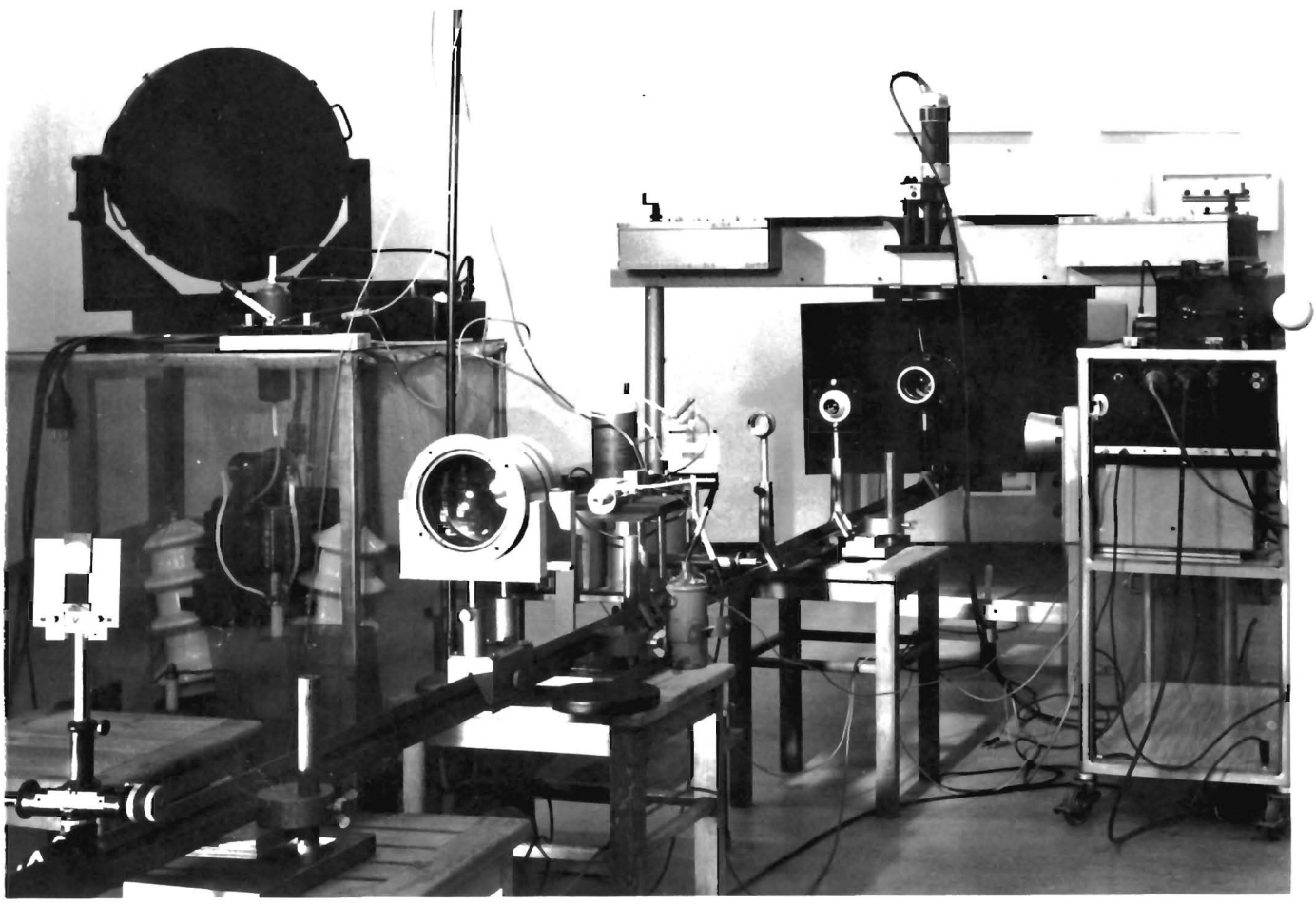
The 'stills' side is equally well equipped, both for location work and photography in and around the laboratories—the processing-rooms contain some of the latest enlargers and so on, the whole being in the charge of Fräulein Hildegarde Seils to whom, incidentally, I am indebted for the illustrations to this report: several of them were taken specially at my request.

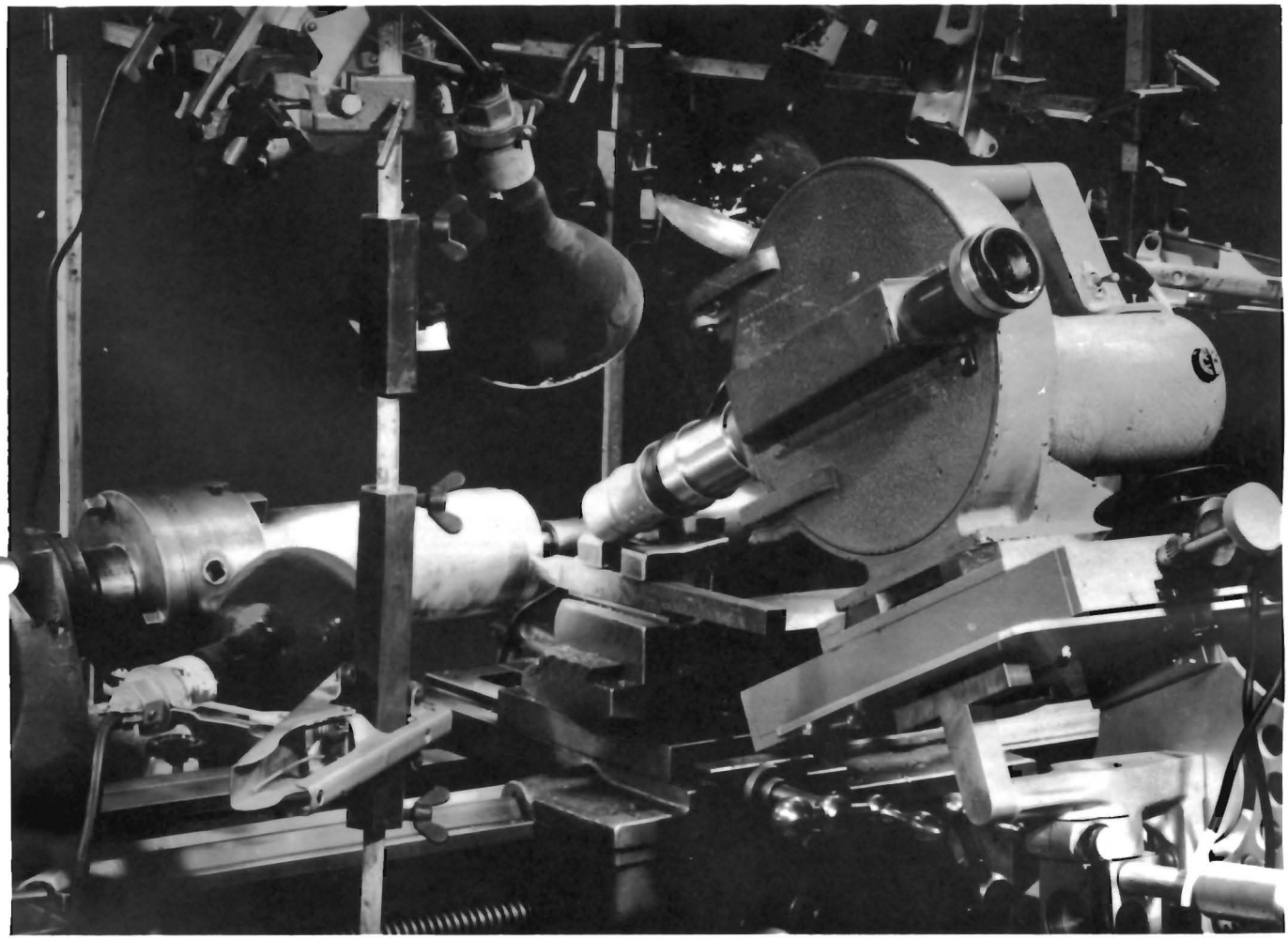
The total number of people engaged in the work of the Institute, though, at the present time is about sixty. Of these, about twenty are responsible for the smooth running of the place and include projectionists, electricians, sound-recording engineers, administrative and library staff, as well as the house-keeper and his staff, which includes the excellently run canteen. It is expected that the total may rise to about one hundred when a number of existing advertised vacancies are filled.

The eventual aim of the Institute is, as a central body in Western Germany, only to deal with really difficult problems for which its resources can be fully mobilised. At the same time, it is intended that as many people outside shall be trained to work in their own universities and research laboratories and to handle the more routine uses of cinematographic for straight-forward investigations. In addition to this general arrangement of work, research teams consisting of a scientist in the subject to be examined with his camera-man and assistant, together with the necessary cameras, accessories, sound recording apparatus and lighting equipment, can be sent in specially fitted vehicles to sites away from Göttingen.

This delegation of work is becoming daily more essential, for at any given time there is an average of about one hundred projects on hand, some of which will involve two or three years' work. This applies particularly to biological work where life-cycles spread over several seasons are involved. As a further example, about five years ago the Institute was asked to look into the

The optical arrangement for filming spark-erosion.





An engineering problem is solved by high-speed cinemaphotography.

operation of a threshing-machine—this was done with the aid of high-speed cinematography. From the results of the investigations changes were made in the design of the machine. The modified machine, having been put to work for a season and tested in a practical way in the field, was then re-examined. From this continuous research over the years considerable improvements have been effected in the overall performance of the machine.

Other practical work has been done on the splintering of car wind-screens, again using high-speed cinematography for the recording of the shattering of the laminated glass under impacts similar to those experienced when a stone from the road is thrown with very high velocity against the screen.

Some new work has recently been begun on the underlying principles of the latest spark-erosion techniques used for such engineering work as the cutting away of difficult shapes when making dies in very hard tool-steels. This investigation has necessitated quite an elaborate set-up in the high-frequency laboratory and from the results obtained it is expected that much new knowledge will be provided about the eating away of the metal at the spark point.

One of the most intriguing set-ups in one laboratory was that for investigating the action of a spider's spinnarets—the live spider was in a rectangular glass case with a sandy floor and had started to spin threads across the face of one glass panel. The camera was focused upon this surface and the illumination came from several electronic-flash heads, synchronised to the camera shutter at a taking speed of 24 pictures per second. Other work which has been done with several varieties of spiders concerns the way in which they take their prey. Yet other work has been done in connection with the continuous fight against harmful insects. The extent and variety of the work undertaken may be gathered from the relatively few demonstrations seen, but it can only give the merest indication of the whole scale of research which continually occupies this very highly trained and skilled team of scientists and technicians working together in what must be very nearly ideal conditions.

I am much indebted to Dr.-Ing. Wolf and his colleagues for their care and courtesy in demonstrating and explaining the many fascinating things which were seen in the Institute and in providing me with the information and illustrations to make this report. The old university town of Göttingen adds considerably to the pleasure of a visit there and, although this was the fourth occasion on which the work of the Institute was discussed in very great detail, the journey is always well worth while. If an invitation can be secured by any seriously-minded cinematographer, interested in the wider applications of the use of film as a research method, then I feel sure that after such a visit there is not only a feeling of great stimulation — if also of considerable envy—to repay the time involved in making the trip.